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OPERATIONS IN GASTRIC ULCER.[1]

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The surgical treatment of gastric ulcer is a comparatively new branch of surgery, the first operation having been performed as recently as 1881; but since that time several hundred operations for perforation of a gastric ulcer have been recorded in various parts of the world. In more recent years operations have also been proposed and successfully carried out in non-perforating cases, on account of severe hemorrhage, or because they had resisted ordinary medical treatment.

There can be no doubt of the importance of this subject to both physicians and surgeons when so great an authority as Ewald has estimated that gastric ulcer affects 5 per cent. of the population. Now, though 75 per cent. are cured by medical means, perforation occurs in from 1.2 per cent. to 12 per cent. of all cases, according to various estimates, and hemorrhage occurs in 45 per cent. of all cases, and, according to Von Leube, is responsible for death in 8 per cent. of the cases in which it occurs. In cases which escape these two complications it is not uncommon to find dilatation of the stomach from pyloric stenosis. We must therefore regard gastric ulcer as a very serious disease.

It is not within the scope of this paper to discuss the causation of symptoms of ulcer of the stomach, but rather to point out the various operations which have been done, the indications for their performance, and the chances of a successful issue.

An operation may be required in several different complications of gastric ulcer. It is absolutely and imperatively demanded in all cases of perforation of the ulcer into the general peritoneal cavity. It is also de-

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manded in cases in which profuse hemorrhage has taken place, and has been repeated within a short interval, and in cases of oft-repeated slight hemorrhages. Finally, it is recommended in those cases which resist ordinary medical treatment, especially in those where there is dilatation of the stomach from pyloric stenosis dependent either upon cicatricial contraction within or on adhesions outside the stomach.

Although there may be a considerable difference of opinion about the propriety of operating in all the above conditions, all will agree with the urgent necessity for surgical interference in cases of acute perforation. I shall therefore consider this condition first. The perforation commonly occurs on the anterior surface, but may occur on the posterior, or on both surfaces. In other cases it is found at the lesser curvature and at the pylorus. The site of the ulcer is mentioned in 47 of my series of cases, and is stated to have been on the anterior wall in 36 cases, on the posterior wall in 8, at the lesser curvature in 2, and on both surfaces in 1 case. In the collection of cases of another surgeon, M. Comte, the site of the ulcer is mentioned in 43 cases, and is stated to be on the anterior wall in 28, on the posterior wall in 8, at the lesser curvature in 4, and at the pylorus in 3 cases. This gives a total of 90 cases in which the site of perforation is mentioned, with 64 on the anterior and 16 on the posterior wall, 1 with both walls affected, 6 at the lesser curvature, and 3 at the pylorus.

The symptoms of acute perforation are usually these: A patient, generally a young woman, with a history of dyspepsia and sometimes of hæmatemesis, has an attack of very acute abdominal pain referred to the epigastric, umbilical, and right hypochondriac regions. This usually occurs shortly after a heavy meal, and is accompanied by very severe shock and severe retching. Vomiting is not a constant symptom, but when present the vomit is not of large quantity and is often blood stained. The pulse is rapid and feeble, and the temperature often subnormal. The abdomen is often retracted at first, there is absence of movement on respiration, and there is great tenderness, which is often specially marked at one spot. There is a peculiar board-like rigidity of the abdominal walls, but the legs are not usually drawn up as in peritonitis due to disease of the viscera in the lower half of the abdomen. Later on it is very common to get a diminution or even obliteration of the area of liver dulness, but this, though a sign of great importance, as indicating the presence of free gas in the peritoneal cavity, is not, however, constant; it has not been noticed in a number of cases, and would scarcely ever occur in perforation of the posterior wall of the stomach. After a few hours there will often be found signs of fluid in the peritoneal cavity, as evidenced by impaired resonance in the flanks, possible fluctuation and thrill, and shifting dulness. Still later, the abdomen will become much distended and tympanitic, with a protrud-

ing umbilicus, and the signs of free fluid will be more marked; diarrhœa usually supervenes, the tongue becomes dry and cracked, the pulse wiry and running, and the temperature high. The patient will gradually sink, and dies within a few days. Occasionally the shock is so severe that the patient succumbs within a few minutes of perforation. Thus in a case recorded by Fenwick, a man died suddenly shortly after a heavy meal; at the autopsy it was found that a gastric ulcer had perforated into the pericardium.

Briefly, then, the symptoms and signs which should guide us in making a diagnosis of perforation are (1) history of previous treatment for gastric ulcer and of the occurrence of hæmatemesis, (2) the sudden onset of the pain, (3) the intense shock, (4) the board-like rigidity of the abdominal walls and the presence of a tender spot over the stomach, (5) the diminution or absence of liver dulness, and (6) the presence of free fluid in the peritoneal cavity.

In the following case, which will serve as an illustration, these symptoms and signs were well marked. A woman, aged twenty-nine years, had been treated for seven months, both in the out-patient department and by her own doctor, for gastric ulcer, and had suffered from several attacks of hæmatemesis. Under suitable diet, etc., she was improving, but on April 23d she felt very hungry, and so ate a large mutton chop; three hours after this she was seized with a sudden pain of great intensity, which doubled her up; there was slight vomiting and considerable nausea. She was seen by her doctor at once and given opium. On the next morning, as the pain still continued and the abdomen had become distended, she was sent up to the West London Hospital, where she was admitted under my care. On admission she looked very ill; her temperature was 99°; her pulse was 100 and weak. The tongue was fairly clean. The abdomen was greatly distended, especially in the epigastric and umbilical regions and in the flanks, and did not move on respiration. There was a board-like rigidity and tenderness on palpation, epecially at a spot just below the costal arch; there was a tympanitic note all over except in the flanks, where the resonance was impaired; there was an indistinct sense of thrill across the abdomen. The area of the liver and of the splenic dulness was diminshed.

In cases of perforation of the posterior surface of the stomach the symptoms will be less marked; there will, however, be as much shock and abdominal pain; but as the lesser peritoneal cavity usually becomes shut off from the general peritoneal cavity by adhesions, there will in such cases be no alteration of the liver dulness, and probably no signs of free fluid in the abdomen. If left to nature a local collection of pus will probably form, constituting one variety of subphrenic abscess, which we will discuss later.

There can be absolutely no question about the importance of an early

diagnosis in cases of perforated ulcer, since the prognosis after operation is directly dependent upon the length of time which has elapsed between the occurrence of perforation and the operation. Thus in a table of 55 cases which I have collected, 33 cases recovered after operation; of these 33 we find the length of time elapsing between perforation and the operation is stated in 25 cases; of these the operation was performed within six hours of perforation in 8 cases, or one-third of the total number of recoveries; in 5 more cases it was done between six and twelve hours, and in 7 cases between twelve and twenty-four hours; in only 5 cases, one-fifth of the whole, was the operation performed at an interval longer than twenty-four hours. If we turn to the 23 fatal cases the time is stated in 17; of these none were operated on within twelve hours, 7 of the cases were operated on within twenty-four hours, 6 within forty-eight hours, and 4 at an interval exceeding forty-eight hours. Thus we find that all the cases operated on within twelve hours of perforation—namely, 13—were successful; of the 14 cases operated on between twelve and twenty-four hours one-half were cured, and of the 15 cases operated on at a longer interval than twenty-four hours only 5, or one-third, were cured. In corroboration of these statistics I would refer to Comte's series of 65 operations for perforation, with 19 recoveries; of these 19 recoveries 11 were operated on within the first ten hours, and two others at an interval of thirteen and sixteen hours respectively, while of the 46 deaths only 6 occurred in cases operated on within the first ten hours. I do not think that more striking evidence of the importance of early operation could be imagined.

Having, I think, proved to you that no delay should be allowed to occur before operating, I will briefly describe the necessary procedure. As a great amount of shock is always present in these cases, we must take special precautions to minimize the shock caused by the operation itself. The patient must be kept warm; if in hospital, a hot-water table should be used; but if this is not available, the patient should be packed round with hot-water bottles, and the limbs should be encased in warmed cotton-wool and flannel bandages. A brandy enema is often required before the operation, and occasionally the intravenous injection of a couple of pints of normal saline solution. No very energetic means can be employed to render the skin of the abdomen aseptic, on account of the great tenderness, but it may be gently washed with soap and water, a compress soaked in a 1 in 20 carbolic acid solution applied; when the patient is under the anæsthetic the skin should be thoroughly scrubbed with a nail brush, then with turpentine, and finally with 1 in 20 carbolic acid solution again. An incision three inches long is made either in the left linea semilunaris, or in the middle above the umbilicus. I rather prefer the former position. On opening the peritoneum there will usually be a large escape of gas, of stomach con-

tents, and of purulent fluid if the ulcer has perforated on the anterior surface of the stomach. A search is then made for the perforation, which may be found about the centre of the anterior surface of the stomach, or near the pyloric end or lesser curvature. In either of these last-named positions it will be more or less concealed by the liver, but some lymph and recent adhesions in this position will usually indicate the site of the lesion. In cases in which there is extravasation of the stomach contents the adhesions should be separated, exposing the ulcer, which will then be seen or felt by the finger. After sponging away any extravasated contents the stomach-wall in the neighborhood of the ulcer should be brought forward as far as possible by grasping the edges of the ulcer with catch forceps. No attempt should be made to excise the ulcer, but it should be invaginated, and the adjacent part of the stomach-wall brought together over it by one or two rows of Halsted's or Lembert's sutures. The sutures must be passed a considerable distance from the ulcer, otherwise they will cut out on account of the friability of the stomach-wall close to the ulcer. The peritoneal cavity should then be thoroughly flushed out with normal saline solution (one teaspoonful of common salt to a pint of boiled water), and if the gastric contents have reached the lower part of the abdomen it will be necessary to make a counter opening above the pubes and irrigate Douglas's pouch in addition. Special care must be taken to irrigate thoroughly the upper surface of the liver and the region of the spleen, in order to prevent the formation of a subphrenic abscess, a complication which marred the success of a case of my own and of two other cases on my list. The abdomen having been well flushed out, a rubber drainage tube is inserted in the upper incision, and a gauze drain is placed over the site of perforation, the rest of the wound being closed in the ordinary way; finally, a glass drainage tube should be inserted into the Douglas pouch through the counter opening above the pubes. If with strong signs of perforation no extravasation is found in the general peritoneal cavity, but there is some injection of the peritoneum, we should suspect the rupture of an ulcer on the posterior surface of the stomach; to reach this, after shutting off the general cavity with sponges, the gastric-colic omentum must be torn through, which will open up the lesser cavity of the peritoneum. If there are no signs of extravasation in the lesser cavity, we may assume that no perforation has taken place, or that sufficiently firm adhesions have already formed. If extravasation be present, we must search for the ulcer, which when found should be sutured after invagination; the lesser cavity must then be carefully irrigated, especial care being taken to clean thoroughly the portion above and behind the liver. The general peritoneal cavity will probably not be soiled, and so will not require irrigation. The wound will then be closed, with the exception of a drainage tube in the lesser cavity.

In either case the operation, of course, must be performed as rapidly as possible, so as to minimize the shock. After the operation the patient should be fed by nutrient enemata and suppositories for the first three or four days, and then feeding by the mouth may be cautiously commenced with preparations which are already partially digested and which leave little residue. The gauze drain and the suprapubic tube should be removed at the end of three days, but the rubber tube should be left in for a few days longer.

When adhesions have formed previous to perforation we may have a communication established with the colon, the pericardium, or with the small intestine, or a localized abscess which will probably be in one of two positions, but in any case is termed subphrenic. In perforation of the anterior surface of the stomach the abscess first forms between the stomach and the under surface of the liver, and then, when prevented from getting into the general peritoneal cavity by reason of adhesions, passes up between the liver and the diaphragm, and forms a tumor just below the costal arch. In perforation of the posterior surface of the stomach the abscess first forms between the stomach and the anterior surfaces of the pancreas and the duodenum; it then passes upward between the posterior surface of the liver and the diaphragm, and if it comes to the surface it will do so between the stomach and the transverse colon; it may, however, perforate into the thorax, forming a pneumopyothorax. If either of these varieties form a swelling in the abdomen they had best be opened in the middle line as high up as possible; in the anterior variety the abscess will be opened at once; in the posterior variety it will be necessary to tear through the gastro-colic omentum in order to reach the abscess. In either case a drainage tube should be inserted, and though some flushing of the cavity is advisable, this must be done with extreme care, so as to avoid breaking down adhesions. In cases in which no abdominal swelling exists, but there is dulness over the left lower costal region, the abcess can best be reached by resection of the eighth and ninth ribs in the axillary line; the pleura, of course, is opened, but the diaphragmatic is sutured to the costal pleura before the diaphragm is divided. The abscess is then drained through this incision.

Before passing on to the statistics of these operations, I would point out to you the risk of mistaking a severe attack of colic, accompanied by collapse and associated with a history of gastric ulcer, with a perforation of the stomach. I have performed an abdominal section in such a case, and on two occasions recently I have been urged to operate in such cases, all of which subsequently recovered without a bad symptom. I would also refer to two cases recorded by Bennett and Tuffier, in which an operation was performed on account of symptoms of perforation, an ulcer on the anterior wall being found in each case, but

perforation had not taken place. In the first case the ulcer was excised, and in the second a gastro-enterostomy was performed, both being successful.

The main factors in making a diagnosis in these cases will be the absence of any interference with the liver dulness, the absence of board-like rigidity of the abdominal walls, the absence of signs of fluids, and the smaller amount of shock. However, in real doubt it is better to open the abdomen than to run the risk of leaving a perforated ulcer till too late for a successful result, since the exploratory incision is practically devoid of risk. In these cases a surgeon should not be considered as a mere carpenter, to be called in only to operate, but he should see the case at as early a period as possible, in order to aid in settling the question whether perforation has taken place. I regret to say that in two cases recently, on account of the time taken in making a diagnosis of perforation and deciding to call in surgical aid, the patients both died before I could do an operation.

With regard to subphrenic abscess, I will mention a very interesting case, in which an empyema originated from this cause. A man, aged thirty-five years, who had previouly suffered from flatulence and slight gastric pain, but who had had no definite symptoms of gastric ulcer, suddenly developed chest symptoms, and coughed up a quantitiy of pus. This continued, and the temperature became hectic; he was admitted to the West London Hospital under Dr. Ball, who diagnosed an empyema, which had burst into the bronchus, and asked me to explore for it. I accordingly resected a portion of the ninth rib in the axillary line, and evacuated some very fetid pus. A week or so after the operation the patient ate some figs, and some of the seeds were found in the dressings. In order to test whether a communication existed between the stomach and the abscess cavity, some methyl-blue was given by the mouth, with the result that the pus from the wound was tinged with blue. We therefore came to the conclusion that there was a communication between the stomach and the abscess, and consequently the case was one of ruptured gastric ulcer, in which a subphrenic abscess had formed, and had burst into the pleura. The patient did well. A similar case has been recorded by Mackenzie, which was successfully treated in the same manner.

Statistics of Operations for Perforated Ulcer. I have collected and tabulated the cases of operation for gastric ulcer which had perforated into the general peritoneal cavity and have been recorded during the last two years. They amount to 55 cases, of which 33 were cured, a mortality of 40 per cent. This percentage is low compared with other tables, but all these cases have been done within the last three years, and, moreover, they cannot be regarded as an absolute guide to the chances of recovery, since surgeons are much more prone

to record successful than fatal cases. If we examine the tables of other authors we find the mortality much greater; thus Mickulicz records a series of 103 cases with 33 recoveries, or a mortality of 67.9 per cent.; Parisier records 99 cases with 33 recoveries, a mortality of 66.6 per cent., and Comte mentions 65 cases with 19 recoveries, or a mortality of 70.76 per cent. If all these series be added together, we shall, of course, be certain to record some cases several times over, but the result ought to give a good idea of the mortality; we should then have 494 operations with 172 recoveries, or a mortality of 65.2 per cent. Now these series contain cases which were operated on many years ago, and those of Mickulicz clearly show the improvement which has taken place in recent years, for out of his 103 cases 35 cases were operated on before 1894, with only one recovery, or a mortality of 97.15 per cent., while 68 cases have been operated since that date, with 32 recoveries, or a mortality of 52.94 per cent. Now if my series of cases, which are all recent, be added to the recent ones of Mickulicz, we should have a mortality of 47.15 per cent.

With regard to the success of operations for subphrenic abscess, I find records of 3 cases of primary operation for this condition during the last two years; 2 of these recovered; there were also 3 other cases in which a subphrenic abscess formed after an operation for perforated ulcer, all of which died. Comte gives 23 cases with 11 cures, Barling 6 cases with 2 cures, making a total of 32 cases with 15 cures, or a mortality of 53.1 per cent. We may therefore consider that the chances of success are no better, if as good, as in operations for perforation into the general peritoneal cavity.

The next indication for operation is hemorrhage. Some interference may be called for (1) in cases of repeated severe hemorrhage which threaten life, and (2) when there are frequent small hemorrhages, as shown by the occurrence of coffee-ground vomit and tarry stools; in such conditions an operation is to be recommended when there is marked anæmia produced, and especially when there are signs of dilatation of the stomach. Although hemorrhage occurs in from 30 to 45 per cent. of all cases of gastric ulcer, only a small proportion of cases require operation When the hemorrhage is only slight and infrequent, or when, though severe, it is not repeated, the case will be better left to medical treatment; on the other hand, I would warn you not to allow a patient to become too debilitated and anæmic before calling in surgical assistance.

There is a large choice of operations in this condition; among these may be mentioned (1) resection of the ulcer, (2) the application of a purse-string suture around the ulcer without excision, (3) gastro-enterostomy, and when the ulcer involves the pylorus, (4) pyloroplasty, and (5) pylorectomy.

The first mentioned operation—namely, resection of the ulcer—is now seldom attempted on account of its high mortality; thus Mickulicz reported 4 cases with 3 deaths. The second method is much to be preferred, and has been followed by greater success; the third method, gastro-enterostomy, aims at giving complete rest to the ulcer by relieving the pyloric spasm, and so putting an end to any dilatation of the stomach, with consequent stretching of the base of the ulcer; the fourth and fifth methods have been successfully employed when the ulcer has involved the pylorus, but they appear to be rather too severe operations even in these cases.

In cases of hemorrhage I would recommend that after performing laparotomy the stomach should be opened and emptied of its contents. If an ulcer can be seen, and its base is not contracted by adhesions to neighboring parts, it should be surrounded by a purse-string suture, so as to constrict its base. If the ulcer be adherent it should not be sutured, but a gastro-enterostomy should be performed; if no ulcer is seen the stomach should be inverted like the finger of a glove, and a search made for a superficial abrasion; this, when found, should be surrounded by a purse-string suture. It is noteworthy that in 7 cases of hemorrhage so severe as to threaten life only a superficial ulceration was present, and the failure to recognize this at the operation was responsible for a recurrence of the hemorrhage, and a fatal issue in at least 2 cases; moreover, in 2 cases of sudden death from hæmatemesis only a superficial ulceration was found at the autopsy.

As a last stage of the operation, it will be advisable to perform gastro-enterostomy in any case in which there is the slightest tendency to dilatation, in order to insure rest to the ulcer. No abdominal drainage will be needed, but the after-treatment will be carried out in much the same way as after an operation for perforation.

Statistics. These are not very satisfactory. I have collected 21 cases of operation for hemorrhage with 8 recoveries and 13 deaths, or a mortality of 61.9 per cent.; of these 6 were cases of excision of the ulcer and suture with 3 deaths, 12 were gastro-enterostomies with 8 deaths, 2 were cases of applicaton of a purse-string suture with 1 death, and 1 case each of pylorectomy (fatal), ligature of the coronary artery, and cauterization of the ulcer (both successful). Hartman records 12 cases with 8 deaths, or a mortality of 66.6 per cent. It is needless to say that up to the present this operation has only been performed on patients who were practically moribund, and so the high death-rate is not surprising.

We have now to discuss the question of operation for those cases of gastric ulcer which resist ordinary medical treatment, and for those in which there is dilatation of the stomach in consequence of cicatricial contraction of the pylorus. These may well be considered together

since in most cases which resist medical treatment some dilatation of the stomach will be found to have taken place. According to the statistics of Von Leube an operation will be required in only a few cases, for out of 1000 cases of gastric ulcer which he had treated 750 were cured by medical treatment, 210 improved, 16 derived no benefit, and 24 died.

According to these statistics an operation would be required in only about 4 per cent. of all cases, but might be permissible in a further 21 per cent. under certain circumstances. Thus in a case of old-standing ulcer, in which the patient is unable or unwilling to follow the necessary diet, an operation may be offered to the patient; secondly, in cases of severe pain, progressive emaciation, and vomiting, or where the patient does not appear to get any better, an operation will be indicated; lastly, in cases of dilatation of the stomach, either from actual ulceration or cicatricial contraction, especially if a tumor be felt in the pyloric region, some operation is demanded. I should here mention that many cases of gastric ulcer in the neighborhood of the pylorus, accompanied by inflammatory thickening and causing dilatation, have been diagnosed and treated as cases of new growth; this is especially apt to occur when the glands in the hilus of the liver are affected, although these glands are often affected in consequence of gastric ulcer. I have made this mistake in two cases, in one of which there was a large swelling at the pylorus, with enlarged glands in the hilus of the liver; as I thought the growth too extensive for removal, I performed a gastro-enterostomy; at the end of one year the tumor had disappeared and was replaced by a cicatricial tissue; in the other the pylorus was occupied by a fibrous ring, the result of old ulceration; this case was cured by Loretta's operation.

The occurrence of dilatation of the stomach in cases of ulcer at the pylorus is generally admitted; but it is further urged by Olivier that pyloric spasm often exists in cases of ulcer in other parts of the stomach and is due to the hyperacidity of the gastric contents so frequently met with in these cases. The fact that dilatation of the stomach undoubtedly impedes the healing of a gastric ulcer, and that its treatment by the passage of a stomach tube and lavage is contraindicated in ulceration, is used as the chief argument in favor of the performance of gastro-enterostomy in cases where dilatation is present.

The operations which may be performed in these cases are (1) gastro-enterostomy, (2) pyloroplasty, (3) pylorectomy, and (4) Loretta's operation. The last named is not very satisfactory, and the third is too severe for an ordinary case, but may be required in cases where pyloroplasty has been attempted, but the parts have been found too friable to hold the sutures. The choice of operation will therefore lie between gastro-enterostomy and pyloroplasty, and opinions are fairly evenly balanced in favor of each.

In either operation the abdomen is opened either in the middle line or by a transverse incision parallel to the costal arch. If gastro-enterostomy is to be performed, it is desirable to attach the jejunum to the posterior surface of the stomach. The posterior surface of the stomach is exposed either by tearing a hole in the gastro-cœlic omentum or by turning up the colon and great omentum. The first part of the jejunum is then sought for, and is applied to the posterior surface of the stomach, being united preferably by sutures, all of which should be passed before either gut is opened. Care should be taken to make a sufficiently large opening between the two visceræ, on account of subsequent contraction of the stomach. The parts are then replaced and the abdominal wound closed. The methods of performing the anastomosis, which should always be a lateral one, are very numerous, and include the use of various apparatus, such as Mayo-Robson's and Allingham's bone bobbins, Senn's plates, Paul's ring, etc. Personally, I prefer and have always practised simple suture with mattress sutures.

If pyloroplasty is to be performed a horizontal incision is made over and into the pyloric orifice, and this incision is sutured in a vertical direction, producing a large pyloric opening. Bone bobbins, etc., may be used to assist the suture. The after-treatment of these operations differs little from that of other operations on the stomach, except that in uncomplicated cases feeding by the mouth may be commenced after forty-eight hours.

Statistics. The success of these operations has undergone a great improvement during the last few years; thus, while Cutler and Elliott and Grieg Smith estimate the mortality of gastro-enterostomy at 30 per cent., Mickulicz estimates it at 16 per cent., with a series of 68 recent cases. If we examine the cases recorded during the last two years, including a series of 21 successful cases by Doyen, we shall have 63 cases with 4 deaths, or a mortality of 6.4 per cent. If Mickulicz's collection is added to mine we have 131 cases with 15 deaths, or a mortality of 11.5 per cent.

With regard to pyloroplasty, which is a more modern operation, the results are slightly inferior. I have collected 109 cases with 17 deaths, or a mortality of 15.5 per cent. Mickulicz records 76 cases with a mortality of 13 per cent., while Cutler and Elliott estimate it at 12 per cent. If we add Mickulicz's cases to my collection we have 185 cases with 27 deaths, or a mortality of 14.5 per cent. I have not many statistics for the other operations, but Cutler and Elliott estimate the mortality after pylorectomy at 35 per cent., and that after Loretta's operation at 15 per cent. If we now add all the cases of all these operations we have 242 operations for gastric ulcer and its complica-

tions, other than perforation and hemorrhage, with 32 deaths, or a mortality of 12.4 per cent.

The last condition in which an operation may be required is when adhesions have formed, after the cicatrization of a gastric ulcer, between the stomach and neighboring organs, such as the liver, the spleen, the transverse colon, the omentum, the small intestine, or the anterior abdominal wall. If the adhesions are in the region of the pylorus they will probably cause a kink, and so produce dilatation of the stomach; when in other parts of the stomach they may produce persistent vomiting or only severe pain. In my experience this pain from adhesions is worse in the early morning before food has been taken. The following illustrates the class of cases where pain is the only symptom: A woman, aged forty years, had been under treatment in hospital for eight weeks for gastric ulcer accompanied by severe hæmatemesis. Although there had been no further bleeding since admission, she suffered from severe attacks of abdominal pain, which were more marked in the early morning. As these attacks of pain became more frequent and more severe, although the patient was kept in bed and on a limited diet, an exploratory operation was performed, and adhesions between the stomach and omentum were found.

The treatment consists in opening the abdomen in the middle line and examining the surface of the stomach; if adhesions exist between the omentum and the stomach, the omentum should be divided between two ligatures, as was done in my case; if adhesions exist with other organs, they had better be carefully separated with the finger, and if the surface of the stomach then shows a thin cicatrix, it will be best to invaginate and suture the scar, so as to avoid the risk of a subsequent perforation.

I am afraid that I cannot give you any statistics of this operation, but the mortality should be practically *nil*, since no important parts are interfered with. I have performed two such operations myself, and two others have been recorded by Mayo-Robson and Clive-Low, all of which were successful.

I think that this concludes the list of operations which may be required in the treatment of gastric ulcer. Mickulicz states that the mortality of operations in gastric ulcer does not exceed 10 per cent., and if all my statistics are massed together, with the exception of those which are known to have been operated on before 1894, we have a series of 422 operations for gastric ulcer and its complications, with 71 deaths, or a mortality of 16.5 per cent. When we compare these results with those of treatment without operation—namely, Von Leube's series of 1000 cases with 75 per cent. of recoveries—we ought only to compare them with the results in the 250 cases which were not cured.

Out of these 250 cases, 24, or 9.6 per cent. died, and a further 16, or 6.4 per cent., derived no benefit, making a total of 16 per cent. which either died or resisted treatment; the mortality of my collection of cases —namely, 16.5 per cent.—does not compare unfavorably with these results, especially when we remember that a considerable number of my cases were almost moribund when the operation was performed. I feel confident that when surgical interference is practised earlier we shall have very much better results, and I believe that with a better knowledge of what surgery can do in these cases, practitioners will be only too glad to avail themselves of its assistance at an early period of the case. To show how little the urgent necessity for early operation, even in cases of perforation, is recognized, I would refer you to a report of eight autopsies on cases of perforated ulcer recorded by Sutherland, in only one of which was an operation performed, and this too late to have much chance of being successful. Had these cases been operated on about one-half would probably have recovered.

In conclusion, I would briefly recapitulate the class of cases of gastric ulcer in which an operation should be done:

1. In all cases of perforation at the very earliest possible moment; also in subphrenic abscess.

2. In cases of hemorrhage (*a*) when there is continual oozing of blood, especially if the stomach be dilated, and (*b*) in cases of repeated severe hemorrhage.

3. In cases where there is severe pain and vomiting unaffected by treatment, and which is producing progressive emaciation.

4. In cases of dilatation of the stomach from contraction within or from adhesions outside the stomach.

The operations to be performed are: In class 1, laparotomy and suture of the ulcer; in class 2, gastrotomy and suture of the ulcer, with a purse-string suture, combined with gastro-enterostomy; in class 3, gastro-enterostomy, in order to give physiological rest to the ulcer; and in class 4, either gastro-enterostomy, or, if the pylorus be affected, pyloroplasty or pylorectomy.

As the surgery of gastric ulcer is a comparatively new subject, I have had, so to speak, to make a case in its favor. It has been my endeavor to show that no patient ought to be allowed to die either from perforation, or from hemorrhage from a gastric ulcer, without a surgical effort being made to save him; that the earlier such effort is made the better the chance of success, and, finally, that surgery offers much hope of success in other cases which resist the art of the physician.

General Statistics.

Collected by	Nature of operation.	Cause.	No. of cases.	Cured.	Died.	Percentage of mortality.
Bidwell,	For perforated gastric ulcer.	General peritonitis perforation.	55	33	22	
Comte,	" " "	" " "	65	19	46	
Barling,	" " "	" " "	31	11	20	
Le Dentu,	" " "	" " "	25	5	20	
Chaput and Mauclair,	" " "	" " "	45	15	30	
Houzé,	" " "	" " "	67	20	47	
Mickulicz,	" " "	" " "	103	33	70[1]	
Schwartz,	" " "	" " "	23	3	20	
	Total		414	139	275	66.42 per ct.
Comte,	Incision and drainage of abscess.	Subphrenic abscess.	23	11	12	
Barling,	" "	" "	6	2	4	
Bidwell,	" "	" "	4	3	1	
	Total		33	16	17	51.51 per ct.
Marion,	Operations for hemorrhage.	Severe or repeated hemorrhage.	9	3	6	
Bidwell,	" "	" " "	12	6	6	
	Total		21	9	12	57.14 per ct.
Carle and Fantino,	Gastro-enterostomy.	Dilatation or pain.	24	22	2	
Doyen,	" "	" "	21	21	...	
Doyen,	" "	" "	12	11	1	
Mickulicz,	" "	" "	68	57	11	16 per ct.
Bidwell,	" "	" "	5	4	1	
	Total		130	115	15	11.53 per ct.
Carle and Fantino,	Pyloroplasty.	Dilatation or pain.	14	13	1	
Mikulicz,[1]	"	" "	76	66	10	13 per ct.
Corraza,	"	" "	53	47	6	
Comte,	"	" "	38	29	9	
Bidwell,	"	" "	4	3	1	
	Total		185	158	27	14.7 per ct.
	Grand total		783	437	346	44.18 per ct.

[1] Before 1894, 35 cases, 1 cured. After 1894, 60 cases, 32 cured.

EPITHELIOMA AS A SEQUEL OF PSORIASIS AND THE PROBABILITY OF ITS ARSENICAL ORIGIN.[1]

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In November, 1898, Miss M., aged thirty-five years, came under my professional care through the kindness of Dr. H. W. Stelwagon, whose patient she had been for many years, but who no longer found it convenient to look after her. At that time she presented the following lesions: On the outer side of the heel of the left foot was an ulcer about two inches in diameter, shallow at the edges but quite deep in the centre, with a perfectly flat, uninfiltrated border. Close by this large ulcer, which was very painful, was a much smaller, very superficial one, which was evidently undergoing cicatrization. In addition to these ulcerative lesions the soles of both feet were the seat of a marked keratosis, which existed as diffuse patches upon the heels, and shot- to pea-sized, clavus-like elevations, most numerous beneath the metatarsophalangeal articulations. The palms of both hands were also the seat of a keratosis even more marked than the soles, the palmar surface of the fingers presenting numerous shot-sized, corneous elevations, while the centre of the palms was dry and thickened. Besides these keratosic lesions there were several small, superficial ulcers upon the palmar surface of the fingers, which had originated at the site of corns and were quite painful. Upon the elbows and trunk were a few patches of psoriasis, which presented nothing unusual. Upon the left breast was an irregularly oval, quarter-dollar-sized, red, somewhat thickened, slightly crusted patch, which was just beginning to ulcerate in small areas. In the left groin was a bosselated tumor the size of a small orange, firm and elastic, except upon the summit, where the skin was evidently upon the point of giving way. The history of the case, as obtained from Dr. Stelwagon and the statements of the patient herself, was as follows: At fourteen years of age she began to have psoriasis of the ordinary type, from which she had never been entirely free since, and for which she had taken arsenic in considerable doses over long periods of time. Some nine or ten years after the first appearance of the psoriasis horny patches and corn-like elevations began to appear in the palms of the hands and on the soles of the feet, and at a still later period—how soon after the keratosis I was not able to learn accurately—small, superficial ulcers occurred beneath these horny masses, which

[1] Read at the twenty-third annual meeting of the American Dermatological Association, May 30, 1899.

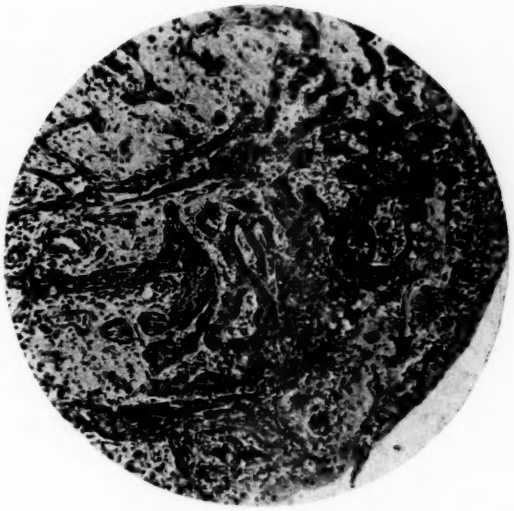
obstinately refused to heal under any kind of treatment. At this time an ulcer appeared upon the left heel (Fig. 1), near the site of the one above described, which, after being treated in vain with various local applications, was thoroughly curetted by her medical attendant and

FIG. 1.

healed entirely. One year later a new one appeared, which slowly but steadily extended until the patient's death, uninfluenced in its progress by treatment. Seven months before the date of my first visit the tumor in the groin began, and this steadily, at first slowly, but later more rapidly, grew larger. The history from this time on can, unfortunately, be told in a very few words. The tumor in the groin speedily ulcerated, forming a deep, fungating, foul ulcer, which discharged very abundantly. This was soon followed by more or less continuous fever, loss of appetite, rapid emaciation, and death about two months after my first visit. During the short period the patient was under my observation the large ulcer upon the heel underwent but little change, but the one alongside of it, and another upon the palmar surface of the middle finger of the left hand, which was unusually painful, were completely cicatrized some little time before death occurred, both having lasted many months. The few patches of psoriasis present at an earlier period also completely disappeared. Soon after taking charge of the case I excised a small portion of the margin of the ulcer upon the heel, and submitted it to microscopical examination. This fully established the carcinomatous character of the lesion. There were many well-defined, slender, branching tracts of epithelial cells extending well down into the corium, a considerable number of epithelial cell-nests, and a scanty infiltration of round cells. (Fig. 2.) Sections of the secondary tumor in the groin, made after death, showed it to be composed of epithelial cells contained in thin-walled alveoli. While I think we may assume that all the ulcerative lesions were of the same character, I regret that this was not established beyond doubt by sections of the smaller ones; but this precaution was in some manner overlooked.

To sum up the leading features of this very interesting case, we have a psoriasis, first, of the ordinary kind, lasting many years, for which arsenic was taken in considerable doses for long periods; after a time keratosis of a peculiar type upon the palms and soles, characterized by the formation of clavus-like elevations; and, finally, epithelioma at the site of several of these corneous lesions, followed by a metastatic growth in the groin, causing the death of the patient.

FIG. 2.



The first case of epithelioma associated with psoriasis of which I have been able to find any record was reported by Pozzi[1] in 1874. The patient was a man, aged forty-five years, who had suffered twenty-five years from confluent psoriasis. There was also psoriasis of the nails, with considerable hypertrophy of the subungual derma. The epithelioma, which was of very slow evolution, began as a small excoriation upon the foot five years after the appearance of the psoriasis. In addition to the hypertrophy of the nails, already alluded to, there were epidermic warts.

A few years later Cartaz[2] reported a second case. A man, aged forty years, had had psoriasis twenty-three years, first appearing upon the elbows, then upon the soles of the feet, and, finally, upon different parts of the body. Upon the palms and soles the psoriasis had produced verrucose scales, varying in size from a pin-head to a lentil. In

[1] Bulletin de la Société Anatomique de Paris, 1874. [2] Ibid., 1877.

consequence of repeated scratching of one of these warty elevations upon the palmar surface of the right ring finger it was torn away, producing an ulcer which, instead of healing, gradually enlarged. A diagnosis of "cancroïde" was made, and amputation performed. In neither of these two cases is any mention made of the kind of treatment employed, if any, against the psoriasis.

In 1885 a distinguished member of this Association, Dr. J. C. White, reported two cases of long-standing psoriasis, followed by wart-like growths, which terminated in carcinoma.[1] In the first of these the patient was a man in whom psoriasis began at twenty-one years of age, and was constantly present from that time on in a greater or less degree, notwithstanding treatment by Fowler's and Donovan's solutions. After about fifteen years' duration several of the psoriatic patches began to undergo keratosic change, being finally converted into outgrowths like callosities or some form of wart. Some years later one of these wart-like outgrowths seated upon the right palm, and another upon the left, began to ulcerate, and in spite of various applications, cauterization, and scraping, gradually grew larger. Finally, as a last resort, the right hand and the fore and middle fingers of the left were amputated. A microscopical examination established the diagnosis of cancer. The second patient was also a man, aged fifty-two years, who had suffered from psoriasis since early manhood, for which various methods of treatment had been tried, including arsenic. At about forty years of age several of the patches of psoriasis upon the hands became thickened and horny in appearance, and were finally transformed into warty outgrowths, one of which, upon the palmar surface of the wrist, softening formed an ulcer two by one and a half inches, which refused to heal in spite of repeated cauterizations and scrapings. There was also a warty formation which was beginning to soften between the fingers. There was a small ulcerating patch upon the buttocks and two small crusted excoriations upon the penis and in the groin respectively. The diseased tissues were thoroughly excised, and healing was progressing favorably, when a deep cellulitis of the axilla, accompanied by grave constitutional symptoms, suddenly developed, causing the death of the patient. In this case, as in the preceding one, the clinical diagnosis of cancer was confirmed by the microscopical examination.

In 1887, at a meeting of the Pathological Society of London, Mr. Jonathan Hutchinson[2] reported three cases of psoriasis which terminated in carcinoma; but one of these, as it appered later, was the first case, already reported by Dr. White. Mr. Hutchinson's first case

[1] American Journal of the Medical Sciences, vol. lxxxix.
[2] British Medical Journal, December 10, 1887.

occurred in a man whose psoriasis had lasted for many years, and for which he had taken arsenic. A corn, after a time, appeared upon the sole of the foot, which ulcerated, and the ulcer continuing to enlarge in spite of treatment, it was excised. A microscopical examination of the excised lesion was inconclusive as to its nature. Small corns had also developed upon the palms of the hands. The third case was also a man, aged thirty-four years, with a long-standing psoriasis, for which he had been treated with arsenic for a long time. Small corns were scattered over the palms and soles. After a time epithelial cancer of the scrotum developed. To these cases he has recently added another.[1] The patient was a man, aged forty-six years, who had suffered from psoriasis from boyhood, for which he had taken liberal quantities of arsenic for many years. After a time cancerous ulceration of two patches of psoriasis, one on the abdomen the other on the back, developed, and this was followed by a glandular growth in the groin, which ulcerated, forming a large excavation. The patient finally died from exhaustion. Although the palms were harsh and dry no actual keratosis was present.

Hans Hebra[2] has reported a case of multiple epitheliomatous lesions occurring in a man who had been the subject of psoriasis for many years. The psoriasis, which at first did not differ from the ordinary type, after a time assumed a warty character, requiring mechanical means to remove the epithelial deposits. Three years after the patient was first seen the warty excrescences split up, causing fissures and deep losses of substance. Ulcers appeared upon the arm and thigh which refused to heal. One of these upon the thigh was excised, but soon returned. Fever and rapid loss of strength ensued, and the case terminated fatally. No details as to the treatment of the psoriasis are given. Examination of the excised parts demonstrated the epitheliomatous character of the ulcers.

Arbuthnot Lane[3] has also reported a case of multiple epithelioma occurring in a psoriatic man, aged sixty years, who had taken arsenic for thirty years. On the forearm was an ulcerating epithelioma two inches in diameter. This was removed, but one year later three separate epithelial growths appeared upon the scrotum and perineum, and these were soon followed by two other raised plaques in the same locality. These lesions were excised and found to be epitheliomatous. A month or two later two new typical epithelioma were removed from the scrotum. Altogether the patient had eleven separate foci of malignant growths—four on the forearm, seven on the scrotum and perineum—but in only one, near the anus, did the growth seem to arise in a patch of psoriasis.

[1] Archives of Surgery, 1898.
[2] Monatshefte f. praktische Dermatologie, January, 1887.
[3] British Medical Journal, February 9, 1894.

Geyer,[1] in the very extensive bibliography appended to a recent paper upon the chronic changes induced in the skin by arsenic, refers to a case of carcinoma of the hands arising from a plaque of psoriasis, reported by Power. Beyond the statement that the case was regarded as one of cancer, probably due to arsenic, no details are given, and I have been unable, to my great regret, to find the original report, although it was diligently searched for.

These ten cases, which, after a careful search, I believe comprise all thus far reported, together with my own, present a remarkable uniformity in their clinical features and course. In all of them the psoriasis, which at first presented the ordinary type of eruption, was of long standing, usually many years; in all but three some form of keratosis was a marked feature, appearing after a variable period, most frequently upon the palms and soles in the shape of corn-like excrescences, and finally cancerous ulceration, beginning beneath one or more of these horny excrescences, occurred. In all in which any mention is made of the treatment of the psoriasis—eight out of the eleven—arsenic had been given in considerable quantity for a long period; and, in view of its almost universal use in this malady, its administration in the remaining three cannot be positively excluded. It deserves special notice, that in a large proportion of the cases—50 per cent.—the cancerous ulceration appeared before forty years of age—in one, that of Pozzi, as early as twenty-five—and it is also remarkable that in the same large proportion—50 per cent.—the ulcerative lesion was multiple. The early appearance and multiple character of the carcinoma accompanying psoriasis would seem to point to some special etiological factor.

While the whole number of cases is a small one, yet it is too large to permit the assumption that the association of these two diseases was entirely an accidental one. When Mr. Hutchinson reported the two cases referred to above, it was in support of the statement made by him that arsenic given in large doses for a considerable time might produce a form of epithelial cancer. Upon the same occasion he referred to a case, communicated to him by Allbutt, in which a young lady who had taken arsenic for many years for pemphigus, with only occasional remissions, after a time developed an ulcer upon the crest of the ilium. Following the development of this ulcer, the glands enlarged and a tumor appeared upon the thigh, causing the patient's death at twenty-five years, an extremely early age for death from carcinoma. Some years later he reported another case, under his own observation,[2] in which a man, aged thirty-five years, became the subject of keratosis of the palms, which was followed by cancer of the palm and scrotum. This patient had taken considerable quantities of arsenic for

[1] Archiv f. Derm. und Syph., Bd. xliii.

[2] Archives of Surgery, vol. v.

acne. It should be noted, too, that the ulcerative lesions were multiple.

But prior to these observations of Hutchinson, Hardy[1] declared that he had seen cancer develop frequently enough in those affected with psoriasis to believe in a certain connection between the two maladies, and he quoted Bazin as holding the same opinion. Nielsen, on the other hand, although he saw a cancer of the breast develop in one of his cases, found the two affections so rarely associated in his experience that he could trace no connection between them.[2]

So long ago as 1851, Romberg[3] described an affection of the palms and soles characterized by epidermic desquamation, due to the internal use of arsenic. At a later period, Erasmus Wilson[4] called attention to the fact that not only desquamation of the palms and soles might be produced in this way, but also thickening of the epidermis and the formation of small "corns," the latter being seated at the mouths of the sweat-ducts. Within recent years a considerable number of cases of palmar keratosis due to arsenic have been reported by trustworthy observers, such as Hutchinson, Colcott Fox, Crocker, Malcolm Morris, Pringle, Hardaway and others. In these cases the arsenic had been taken for such a variety of dissimilar affections, such as acne, pemphigus, lichen planus, laryngitis, epilepsy, sarcoma, psoriasis, that the keratosis could in no way be regarded as the consequence of the disease; or it had been introduced into the system accidentally, producing, besides the keratosis, other symptoms of arsenical poisoning. In the greater number there were shot- to pea-sized firm elevations resembling the ordinary corn. Now, it is a very suggestive fact, that in eight out of the eleven cases of psoriasis followed by epithelioma some form of keratosis preceded for a greater or less period the appearance of the cancerous lesion, and in seven this keratosis was of the palmar and plantar variety, such as is found in the majority of cases due to arsenic. Certainly, this fact lends strong support to the view that the carcinoma may also be of arsenical origin.

In discussing the report of Lane's case, referred to above, Mr. Hulke, the then President of the Clinical Society of London, remarked that he had made inquiries among the workers in the mines of Cornwall, who are exposed to the inhalation of arsenic vapors, as to the occurrence of such growths among them, but he had not been able to learn of any; and Mr. Butlin,[5] who at another time had made a somewhat similar inquiry among smelters exposed to arsenic fumes, did not find that

[1] Traité des Maladies de la Peau.
[2] Selected Monographs on Dermatology, New Sydenham Society.
[3] Klinische Wahrnehmungen und Beobachtungen.
[4] Lectures on Dermatology, 1873.
[5] Three Lectures on Cancer of the Scrotum in Chimney-sweepers and Others. British Medical Journal, 1892.

such workers were especially liable to carcinoma, particularly of the scrotum, as had been asserted. But this negative evidence is, in my opinion, more than offset by the statement recently made by Geyer, in the paper already referred to, that among the inhabitants of Reichenstein, a small town in Prussia, where arsenic mining is carried on, carcinoma, having its beginning in "arsenic warts" on the fingers, is frequently observed. And it is especially significant, that beside other evidences of arsenic-poisoning, such as melanosis and cachexia, diffused and circumscribed keratosis of the palms occurs in these cases, six such being referred to in a communication made to Geyer by physicians resident in the place.

Conclusions drawn from so small a number of cases cannot be considered as final, but the evidence thus far in our possession is, I think, of such a character as to permit us to accept as very probable, at least, the arsenical origin of the epithelioma in these cases.

In concluding, I wish particularly to call attention to the very great importance of this subject in connection with recent theories concerning the pathogenesis of carcinoma in general. If it can be shown that the internal administration of arsenic is capable of producing carcinoma, we must either abandon all theories as to the parasitic origin of this grave malady, or we must assume the multiple character of the agents capable of producing it.

A CASE OF CYSTIC DEGENERATION OF THE KIDNEYS, WITH GENERAL DERMATITIS EXFOLIATIVA.

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The combination of these two rare affections is perhaps unique, though the presence of generalized skin troubles in kidney disease is not altogether uncommon, and leads to a serious prognosis. Dr. Samuel West and others have noticed that such eruptions, especially when they are of an acute type, if they are accompanied with albuminuria or evidences of granular kidney, generally end fatally. It has been disputed whether these rashes are uræmic in origin, or due to the retention of some irritant without the presence of uræmia, or whether they are accidental. There are rashes peculiar to kidney disease, but a generalized dermatitis may, of course, occur during perfect health. Indeed, Hebra's pityriasis rubra, which the present case was not unlike in appearance, is a peculiarly lasting and sometimes a congenital affection unconnected with any known disease. Certainly, cystic kidneys exist

for years without definite symptoms, and skin affections are very rarely noticed with them.

T. W., aged forty-three years, a carter, came to the hospital as an out-patient in July, 1898, complaining of cough and dyspepsia. He was a stoutly built man; a teetotaller; had always been of a sallow complexion, and never perspired freely. A year before he had suffered from influenza, and in December he began to feel weak. In February he had a violent attack of lumbar pain, and in April he was noticed to be drowsy, and to be passing water at night more often than he had done before. His wife remarked that his scalp became full of dandruff, and in July a dry scaly eruption attacked a patch of skin on his back and itched a good deal.

I noted on first seeing him that he was anæmic, and that the urine was pale and showed a slight cloud of albumin. No high tension of the pulse was detected, though the aortic second sound was accentuated. The area of cardiac dulness was not enlarged and there were no murmurs. Nothing abnormal was found in the lungs.

Shortly after this he found that the scaly eruption became universal, and that his feet and a little later his whole body became swollen. On July 26th he proposed going to the seaside, but I persuaded him to come at once to the hospital, on account of his condition. There was at that time considerable diffuse œdema of the face and every part of the body; the stiff, thickened fingers were especially remarkable, while the skin was peeling off everywhere in dry, branny scales, leaving here and there a red denuded surface without any weeping. The urine was found to be normal in quantity; sp. gr. 1010 to 1017, acid, and showing a trace of albumin. He was kept in bed on a light diet, with milk and fish. The temperature was normal, and the urine remained throughout at thirty-six to fifty-three ounces daily, the bowels being regular. The skin improved rapidly, the œdema and albumin disappeared, and he expressed himself as quite comfortable, except for a slight cough. Suddenly, on the morning of August 6th, he sank into a comatose condition, for which he was actively treated by purgation, venesection, cupping, and pilocarpine without avail; death took place in a few hours.

Post-mortem (notes by Mr. F. P. Mackie). Upon examination forty hours after death the body is found well nourished, œdematous, and showing slight rigor mortis. The skin over the hands and feet is still peeling off, but otherwise normal The lungs overlie the heart and are emphysematous at the edges They are heavy and retain their shape. The lower lobes of both are œdematous, and there are evidences of bronchitis, with pus in the smaller bronchi. The upper lobes are normal. The heart shows post-mortem staining and commencing decomposition of the muscle, which is pale and flabby. The mitral valve admits four fingers, the tricuspid five, the aortic and pulmonary valves are competent, and all the valves healthy. The spleen and pancreas are normal, while the liver is pale, soft, and somewhat fatty, but shows no other change. The kidneys present well-marked cystic degeneration, and measure about seven inches by four inches.

The cysts vary in size up to that of a walnut, some filled with a clear gelatinous, and some with a reddish-brown, grumous material. The lining membrane of each cyst is well marked. There are no hemor-

rhages in the surrounding tissues and no trace of normal kidney substance. The ureters show nothing unusual. In the brain the only noticeable changes are a thickening and opacity of the pia mater and arachnoid over the left parietal and frontal regions, and some cystic change in the choroid plexus.

There are one or two points of interest in the case. First, it seems doubtful whether the œdema was due to the kidney disease or merely an inflammatory infiltration of the skin. It disappeared without any increase of the urinary secretion as the dermatitis faded, and was somewhat firmer in consistence than the passive form is. The eruption was clearly one of the secondary types of pityriasis following upon the patch of eczema on the back and the seborrhœa of the scalp. Such attacks may follow various skin affections, as psoriasis, eczema, and lichen planus. They have been noticed after the use of various drugs, and Hutchinson records several cases in which intolerable itching in the back, as in this patient, was an early symptom. In a recent discussion of the subject at the Dermatological Society of Great Britain and Ireland, Walter G. Smith argued that the condition is not due to a specific disease but to a marked tendency in some persons to a spreading "catarrhal" inflammation set in motion by various causes. Whatever the primary affection, we usually find a sudden onset, the whole of the skin involved, redness, and copious continued desquamation. Rheumatism, vasomotor changes, neuroses, and unknown microbes have all been invoked as causes, but nothing certain is known. Some of those who took part in the discussion referred to the grave prognosis which the presence of the albumin during such an attack leads to. Whether the primary cases, such as Hebra described, and the congenital ones, occasionally met with, differ from the secondary ones in any important point is not clear, but in appearance there is little to distinguish them. Le Cronier Lancaster has reported eight cases occurring in uræmia which commenced as erythematous or papular patches on the extensor surfaces of the limbs, and quickly became universal, either subsiding with marked desquamation or becoming eczematous or pustular. Seven of the eight patients died in a few weeks.[1]

No cysts were found in the liver or elsewhere except the kidneys, where they formed two huge masses, which we failed to detect during life, probably from the amount of œdema present. The contents of the cysts showed quantities of leucin crystals and blood-corpuscles. Indeed, I believe the chocolate-like material in some cysts was chiefly altered blood.

Now, cysts may occur in perfectly healthy kidneys from retention, and are then generally few in number and small in size. The obstruc-

[1] Lancet, 1891, vol. ii. p. 1169.

tion of a calculus may also produce a form of cystic degeneration when the kidney is at times reduced to a mere shell surrounding a single cavity. Again, in ordinary cases of interstitial nephritis, it is not uncommon to meet with a number of small cysts, or occasionally a large single one, situated chiefly in the cortex formed from dilated glomeruli; and, lastly, a very rare affection has been noted by Bland Sutton, Edmunds and others, where a group of cysts form a kind of wedge, surrounded by a capsule, and situated in the midst of healthy tissue.

The true cystic degeneration of the kidneys is different in character from each of these, and results in a great mass composed of cysts which vary in size from a hemp-seed to a walnut. Two forms have been described, one of which is congenital, and often accompanied with other malformations. The other is found in adult life.

In my specimens there is no distinction between cortex and medulla to be made out with the naked eye, nor any normal tissue, but the entire mass is much larger than the original organ. The most remarkable thing about the adult form of the disease, perhaps, is that life can be prolonged indefinitely with such degenerated organs. Patients may remain for years in good health with these huge collections of cysts replacing both kidneys, though probably any extra strain on the system, such as dermatitis, which happened in this case, would suffice to destory life. The symptoms they give rise to are few and often unobserved, so that death may take place from other causes before the disease is discovered. Ritchie[1] gives an analysis of eighty-eight cases which he collected. Taking seventy-five in which details were recorded, we find that the average age at which death occurred was forty-five years. Males were rather more numerous than females. Symptoms had been observed in some of them for as long a period as twenty-two years before death. Seven cases were only discovered post-mortem.

Nearly half the patients showed some albuminuria, though often it was very slight. The urine was generally copious, pale, and of low specific gravity. In some cases lumbar pain and hæmaturia had been occasionally noticed, and a few suffered from dyspnœa and œdema. The most common ending (about half the cases) was by coma, or what was called uræmia; others died from chest complaints, and a few from cerebral hemorrhage. A hypertrophied heart was noticed in less than half the number, while in others it was normal or dilated. It is worth remarking, that the ureters are always pervious, and, on the other hand, not dilated, as we see them in hydronephrosis. About a third showed accompanying cystic disease of the liver and other organs. Thus beside the occasional attacks of lumbar pain and hæmaturia, there is

[1] The Laboratory Reports of the Royal College of Physicians, Edinburgh, vol. iv. p. 194.

little to draw attention to the marked changes which have taken place if the enlarged kidneys are not discovered by palpation.

When we ask how the condition is brought about, we find that some half-dozen opposing explanations have been given: 1. It has been referred to persistent embryonic remnants. Shattuck and Bland Sutton think that a combination of the Wolffian body and true kidney has taken place, and that the cysts originate in portions of the Wolffian body. But Ritchie argues that not only have no nests of undeveloped cells been found, but that in the existing cysts we sometimes see renal tubules actually included as processes inside them. Again, if this view were correct, the origin of the congenital and adult forms would probably be the same, only that in the latter the surviving remnant must have suddenly started into activity late in life; for it seems impossible that these adult patients should have grown up vigorous and strong, and lived forty-five years with an organ crippled like this from birth. The average age at death would be much lower than it is if that were the case. Patients suffering from congenital heart disease rarely reach adult life. But there are strong reasons against a common origin. We do not find in adult cases other failures of development, such as cleft palate, club-foot, and, still more, an absence or malformation of ureters or pelves, which are so common in congenital cases. Cystic disease in the liver, lungs, and other organs is present in nearly one-third of the adult cases, but, curiously enough, it is almost unknown in the congenital affection. Four cases have, indeed, been recorded by Shattock, Still, and Pye-Smith, but none, so far as I know, by other writers, numerous as these congenital kidneys probably are. It is not clear how Shattock's theory can be stretched to explain cystic disease in the liver and other organs. We may notice here that the congenital disease has been also referred to fœtal nephritis, or some other form of inflammation, as well as to atresia of the canaliculi, or to their obstruction by uric acid or a colloid material. G. F. Still, in the report of his combined case,[1] insisted that there was no evidence of inflammation, and referred the lesion to developmental failure.

2. Another theory of cystic disease in the adult suggests that it is caused by obstruction. This may be brought about by colloid, epithelial, or other material in the tubules forming solid plugs, or by external compressions through interstitial fibrosis. The structure would thus be composed of a mass of retention cysts formed out of dilated tubules and glomeruli. In ordinary interstitial nephritis, as I have said, cysts are not uncommon, occurring in 20 per cent., according to Forbes; but they are generally small, and are to be found chiefly on the surface of the organ, or in the zone of limitation; and it has been claimed by some

[1] The Lancet, 1898, vol. i. p. 32.

observers that casts of colloid material are to be seen in the tubules, which are then irregularly distended and contracted above the block, so as to form a chain of minute cysts. Newman, whose authority has much weight, regards this as the mode of origin of adult cystic kidneys, but there is a good deal of evidence against it. The interior of the cysts in these huge kidneys is lined with well-developed epithelium, columnar, cubical, and flattened, sometimes piled up, and there are frequent diverticula and projections or buds formed of masses of young cells, and apparently active proliferation going on. This is hardly what we should expect in mere distension cysts. However, Forbes[1] insists that in the oldest cysts this epithelium is absent, but it would be necessary to show that this absence is not the result of the preparation or of decay in a few of the cysts. Forbes also remarks that in interstitial nephritis the changes begin and are most marked in the cortex, and if small cysts are present, it is just here that they are found; and in true cystic kidneys the change is most advanced in just that region. He refers to a case of his own, in which the cystic changes were well marked in the cortex and almost absent in the medulla. On the other hand, few of these kidneys show any difference in the amount of cystic change between cortex and medulla, and though some increase of connective tissue is found in the remains of normal kidney among the cysts, it has been pointed out that the distribution differs from that in granular kidney, and that it does not exist at all in some places. Bard and Lemoine even think that the proliferation is due to the irritation which the growth of the cysts causes, for there is often none near the dilated tubules, but most of it is around the small actively growing cysts. In the beautiful collection of these kidneys in the General Hospital, Bristol, there is one of a pair which was found in a man of only twenty years of age. It is recorded that the capsule stripped easily, and the parenchyma remaining among the cysts was normal—in short, there was no evidence of interstitial nephritis. Though there are a large number of small cysts on the surface of the kidney, the number in the cortex and the medulla, as seen in a vertical section, is the same. Ritchie, too, finds no difference in the number of cysts in the two regions, and remarks that in cases in which he at first failed to find an epithelial lining in the larger cysts an improved method showed its presence in all. Thus he thinks the essential change is an irritative lesion, which produces great proliferation of the epithelium of the existing tubules and Malpighian bodies and the formation of actively growing cysts, sometimes with the development of blind or imperfect tubules, combined with or followed by connective tissue changes in the neighborhood. Forbes, on the other hand, thinks that adult cystic kidneys

[1] Reports of St. Bartholomew's Hospital, 1897, vol. xxxiii. p. 181.

and granular kidneys containing cysts are due to one and the same cause, but that the former is a more advanced stage of the process.

Apart from the changes in the kidneys themselves, is there any clinical evidence that interstitial nephritis is the cause? In Ritchie's series of cases we find that some thirteen were under forty years of age at death, but up to this age granular kidney is certainly uncommon.

Again, he gives twenty-nine out of seventy-two cases as showing cardiac hypertrophy, or 41 per cent., while Forbes estimates this at 34 and Lejars at 25 per cent., but some of these cases are included in Ritchie's list. Still, the highest figure is considerably short of what we should expect in granular kidney. It may be said that there is great difficulty in diagnosing the latter disease during life, and the copious pale dilute urine with a trace of albumin is a common symptom of it. Now, it is certainly strange, that with a fraction only of the kidney substance left patients can go on in fair health secreting this quantity of urine; but in Rose Bradford's experimental excision of part of the kidneys in animals we get a similar result. If less than two-thirds of the entire kidneys were removed the animal remained in good health and the amount of water excreted was greatly increased, but there was no albuminuria or change in total amount of urea excreted, unless the total of the tissue removed exceeded two-thirds. In other words, as the urea excreting cells are diminished the work is done by forcing a greater quantity of water through the remaining healthy ones, and the total of urea is thus kept up. Therefore, we may say that the copious dilute urine in cystic disease is merely compensatory, and that the difficulty of driving it through the remaining gland tissue leads of itself to such cardiac hypertrophy as we find in some cases. The albuminuria is not necessarily a sign of anything more than the injury done to the cells by the growth, or sometimes of the hemorrhages which often occur in the new-formed tissue. It should, however, be noticed that Forbes finds a great decrease of the total urea in some cases, but how often this occurs does not appear nor how long before the final breakdown.

Finally, the frequent termination by coma, it must be confessed, is against a simple destruction of the secreting area, as we do not find it in suppression from shock or after total excision, and an inflammatory process does undoubtedly take place, as shown by the interstitial proliferation around the small actively growing cysts, though there is much reason for thinking this is not that of granular kidney.

In our present case we saw that there was little or nothing in favor of granular kidney. While the patient was in the hospital he passed from thirty-six to fifty-three ounces daily, with a gravity of 1010 to 1017, and a trace of albumin, which, together with the final coma, might be caused by intoxication from the dermatitis; moreover, neither the heart nor the pulse were those of old-standing nephritis.

Of course, interstitial nephritis and cystic kidneys may accidentally occur in the same patient, especially in persons over forty, but the evidence of a causal relation is defective. In the other forms of kidney disease, parenchymatous or lardaceous, we have even less reason to look for such a connection. There is one instance recorded where the latter was a complication, but there is, perhaps, nothing to support the supposition that epithelial casts ever cause these cysts by plugging the tubules. Clinical evidence is entirely against the view of their origin in parenchymatous nephritis.

3. The other theory to be considered is that these cases are related to the adenomata. N. Senn, in opposing this view, seems to assert that the epithelial lining of the cysts is different from that of the normal kidney, but Bland Sutton points out that the approximation to the normal gland tissue is after all considerable, though the new growth is unable to take on the functions of the old. The columnar, cubical, and squamous epithelium, with its bud-like processes and active proliferation, and the blind tubules sometimes seen in the cysts appear to bear out this assertion. We may, perhaps, regard as a more advanced type those nodular growths and encapsulated collections of cysts to which Kelynack and others would restrict the name of adenomata. The capsulation and the masses of epithelial cells invading here and there the interstitial tissue have not been demonstrated in cystic kidneys, but the alveolar structure and epithelial overgrowth may be conceded. As Prof. Coats remarks, the cysts are obviouly growing structures of well-formed tissue, and the condition probably arises from a perverted function of the renal epithelium. Ritchie's elaborate drawings show not mere retention cysts folded in here and there by external pressure, but masses of new epithelial growth directed inward from the walls of the cysts or alveoli.

However, the distinction between degeneration by the formation of endless retention cysts, on the one hand, and true hyperplasia and adenomatous growths in a complex gland like the kidney is one upon which diversity of opinion is likely, but another point must be referred to. In about a third of the cases we find the presence of masses of cysts in other organs, and it has been rightly said that no explanation is satisfactory which does not account for this complication. The brain, the thyroid, the pancreas, the uterus, and, above all, the liver have been thus affected. In one of the Bristol cases they were found also in the lungs. Kanthack and Rolleston seem to regard the process in the liver as an inflammatory one akin to that in cirrhosis, but it is followed by an epithelial change. New bile capillaries are formed from islands of existing liver tissue and undergo an alveolar transformation. It seems impossible to apply any of the retention theories to the cysts in all these organs, but whatever is the true process, we are totally in the dark as to the nature of the poison which originates the changes.

PURULENT ENCEPHALITIS AND CEREBRAL ABSCESS IN THE NEW-BORN DUE TO INFECTION THROUGH THE UMBILICUS.[1]

By Guy Hinsdale, M.D.,
of Philadelphia.

The brain which I have to show was removed from the body of a child, aged thirteen days, by Dr. J. T. Stanford, of Philadelphia, to whom I am indebted for the following history:

The mother of the child was a colored woman, aged about twenty-seven years, who had had uterine trouble, for which she was treated in the Presbyterian Hospital, Philadelphia, two years ago. She had a miscarriage and subsequent inflammatory trouble, for which her uterus was curetted.

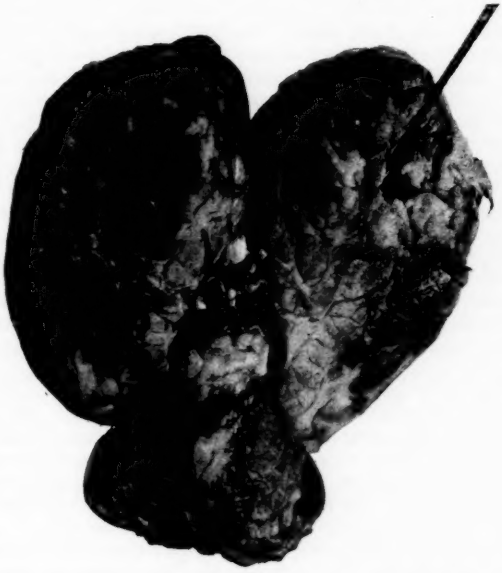
During the early part of her pregnancy she complained greatly of pains in the right iliac region, and external applications were made, with very little relief. She was confined to bed and had some fever. In confinement she was attended by a midwife. After a labor of forty hours' duration she was delivered of a male child weighing twelve pounds. The midwife reported that during and after the expulsion of the placenta a large quantity of pus came from the womb. The child was fed from a spoon, and emaciation became marked after the third day. There was nystagmus from its birth, and he uttered short, shrill, frequent cries; there was continuous retraction of the neck. Dr. Stanford first saw the child four days after birth, and found the temperature 103° F. There were convulsions, but no paralysis; there seemed to be chills, and the mouth had the appearance of thrush. The umbilical cord had a fetid odor. It was then dressed with boric acid, and separated on the sixth day. The child continued to grow worse; he would not nurse, seemed to be in great pain, and died on the thirteenth day.

Autopsy nine hours after death; permission to examine the head only. The skull showed a deficiency at the frontal suture of about one centimetre; otherwise normal. There was no pus between the bone and the dura, but below the pia and generally over all surfaces of the brain was pus reaching down into the sulci. The pus was of a pale yellow hue and quite thick. In the left frontal lobe was an abscess containing about fifteen or twenty c.c. of pus. The cavity was evidently of recent formation and had no limiting wall. In a corresponding position on the opposite side was a large hemorrhage, and all through the cortex were minute hemorrhages. The cerebellum also showed purulent encephalitis. Bacteriological tests were undertaken by Dr. S. S. Kneass, of the Pepper Laboratory of Clinical Medicine. The brain was placed in 50 per cent. formalin solution, and was hardened and examined microscopically by Dr. Joseph Sailer, of the Pepper Laboratory, to whom I am indebted. He made the following report:

Sections through regions of the cortex, where there are macroscopical evidences of inflammation, show slight round-cell infiltration into the

[1] Read before the American Neurological Association, at the twenty-fifth annual meeting, at Atlantic City, June 15, 1899.

subarachnoid space and into the tissue of the pia. These round cells extend also into the tissue of the cortex, which appears in this region to contain fewer nuclei than are normal. In the reflections of the pia between the convolutions the round-cell infiltration is very extensive. All the bloodvessels in the soft membranes are enormously distended, and their walls are infiltrated with granules of hæmosiderin. The lymphatic spaces are distended, their walls forming delicate trabeculæ between the areas of cellular infiltration. No hemorrhages into the arachnoid and pia can be detected. In the cortex the vessels are greatly distended, and there are enormous hemorrhagic areas, causing destruction of the infiltrated nervous tissue, which is filled more or less with crystals of hæmosiderin. The bloodvessels in all parts are distended, and sur-



rounded by a thin layer of round cells. The perivascular cellular infiltration is less distinct in the parts more distant from the cortex. The neuroglia tissue appears to be more reticular than is normal, excepting the extreme outer layer of the cortex, which appears pale, stains badly, and is granular or homogeneous. In this degenerated tissue practically all the vessels are surrounded by extravasations of blood, and there are a few minute accumulations of round cells. The cellular exudate is made up in part of mononuclear cells, with somewhat irregular vesicular pale nuclei, but also contains vast numbers of polynuclear cells and leucocytes, characterized by the intensity by which the nuclei take the stain. In addition, there are a few cells with pale, elongated nuclei. Numerous bacteria are found mixed with the exudate, usually rod-shaped and slightly curved. The nerve cells of the cortex are somewhat swollen. Their nuclei are often irregular, and their protoplasm

takes the stain poorly. In some cases they are distinctly and extremely vacuolated, the vacuoles being much larger than the rest of the cell. The neuroglia nuclei take the stain intensely. They are somewhat irregular in outline, but show otherwise no abnormality. In a section taken from a hemorrhagic area in the interior portion of the right frontal lobe there is considerable infiltration of the subarachnoid space by round cells and some degenerative changes in the adjacent cortex, extending rather further from the pia. In certain areas the round cells appear to have broken into the cerebral tissue, forming aggregations of considerable size. In addition to the more diffuse infiltration, the lymphatic vessels are surrounded and filled with dense masses of these cells, and there are considerable accumulations in the perivascular spaces. The tissue is everywhere infiltrated by a diffuse hemorrhage that in many cases has broken down with the formation of hæmosiderin granules. The cellular infiltration of the folds of the pia dipping into the convolution is enormous. There appears to be an excess of the neuroglia granules. The nerve cells show changes similar to but more severe than those seen in the other specimen. In sections stained by Rosin's mixture hemorrhagic extravasation into the tissue is seen to be very extensive. In some of the bloodvessels partially organized thrombi can be seen. In all situations in the cerebral tissue when round cell infiltration has occurred, bacteria can be found.

The cultures taken by Dr. Sailer from the meninges gave the following results: There resulted a pure culture of a bacillus, measuring from $\frac{1}{2}\mu$ in length, and from 0.5 to 0.8μ in thickness, with rounded ends and without motility. It stains well with the aniline dyes, but is decolorized by treatment by Gram's method. It grows well on all media, producing a white to yellowish white moist opaque or somewhat translucent layer, with irregular but sharply marked edges on agar, solidified blood-serum, and gelatin. There is no liquefaction of the latter medium. Potato develops a spreading, moist, dirty white to yellowish growth, which becomes somewhat brownish in tint in old cultures. Bouillon and Dunham's solution become cloudy, with a granular deposit, and in some cases a slight mycoderm. In the latter medium there is production of indol. Litmus milk shows an acid production with coagulation of the casein and reduction of the litmus. In sugar media there is marked gas production, more in saccharose, maltose, and lactose than in glucose. The organism is quite pathogenic; guinea-pigs inoculated subcutaneously with 1 c.c. of a twenty four-hour old bouillon culture succumbing in twelve hours or even less. Its description corresponds to that of the colon group, and it is probably that known as the bacillus coli immobilis.

The only case of abscess of the brain of which I have knowledge, causing death at an earlier stage in life than in the present instance, is one published by Ribbert,[1] in 1879.

In this case the mother had puerperal fever. The child's epigastrium about the navel was infiltrated, but there were no abscesses. The thoracic and abdominal viscera were without noteworthy changes. Both tonsils and the walls of the pharynx, as well as the larynx and vocal

[1] Berliner klin. Woch., 1879, No. 41, s. 617.

cords, were covered with grayish-white masses, so as nearly to obstruct the passages. Microscopic examination showed oidium albicans or thrush fungus. Section of the brain showed that both hemispheres were filled with minute abscesses about a pin's-head in size. Microscopically, numerous granule cells, white corpuscles, and broken-down tissue. The abscesses were due to embolism.

Dr. L. Emmett Holt reported to the American Pediatric Society, in 1897, five cases of abscesses of the brain in infants, and has collected twenty-seven cases in infants and very young children. His cases occurred at the following ages: Six weeks, three months, five months, nine months, and three weeks. His collected cases varied in age from seven weeks to four years. The bacteriological examinations showed the streptococcus, staphylococcus pyogenes, diplococcus, pneumococcus, and, in one case, a child of three moths, the bacillus coli communis. An organism resembling the meningococcus was found in one case. Oidium albicans is also a cause of purulent meningitis in infants, and it is not surprising that abrasions about the mouth, so frequently the seat of fermenting detritus, should open a pathway for infection. That the colon bacillus should be found in the brain is noteworthy. Dr. L. N. Boston found it in J. H. Lloyd's case, an adult who died on the fourth day of purulent meningitis. Councilman, Mallory, and Wright have found it, but considered it a contaminating organism. Their investigations show that the diplococcus intercellularis is responsible for epidemic cerebro-spinal meningitis in children.

In the case which I present the infection was evidently through the umbilicus, and the lesions of the brain were apparently consistent with a short duration, probably not longer than elapsed between the birth and death of the child. It should be added that the mother made an uneventful recovery.

CONGENITAL IDIOPATHIC DILATATION OF THE COLON.[1]

By J. P. Crozer Griffith, M.D.,
CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA.

Dilatation of the colon may be produced by a variety of causes, and various subdivisions based on etiology have consequently been made by writers. The form most frequently seen is that occurring generally in adult life, the result of habitual constipation. In some instances obstinate fecal impaction has developed, followed by death. In certain cases the obstruction has been brought about by the constipation producing kinking of the bowel through the weight of the

[1] Read before the Association of American Physicians, May, 1899.

contained feces. In others there has developed narrowing of some part of the bowel through external pressure. In the case of a boy of five years, reported by Gee,[1] a cyst compressed the anus. Sometimes the constipation and dilatation appear to be the direct result of an acquired atony, itself depending upon a debilitated system, perhaps the result of some acute exhausting disease. This may occur even in children, as in a case of Gay's,[2] in which great sluggishness of the bowels, with abdominal distention, developed in a boy of seven years who had just recovered from typhus fever.

All dilatations of the types mentioned may be properly designated "acquired." In another class of cases dilatation is the result of some congenital stenosis or obstruction in the colon or rectum, which immediately or slowly causes distention to develop above it. Treves[3] reports such a case, and takes the ground that probably all cases of dilatation of the colon in young children are of this nature. But this view is not supported by the evidence of the numerous post-mortem examinations.

A third class of cases may be called congenital idiopathic dilatation of the colon, and to this class our present study is especially directed.

The term "idiopathic" is employed here, as often, in a necessarily broad and rather loose manner. I would use it to designate an innate tendency to dilatation which is not dependent upon discoverable organic cause. The form of dilatation to which the term applies is not due to stricture or occlusion of any kind. It is not caused by constipation, as in acquired cases, but is itself the cause of this symptom, since the presence of fecal impaction or of scybalous masses is not the rule in this disease. It is not the result of a shortened mesocolon or other discoverable organic condition producing kinking. Although the great length of the sigmoid flexure in infancy probably predisposes to the development of the dilatation, yet this is in itself not the cause in idiopathic cases, else we should find the disease much more frequent than it is. Besides, in nearly all cases it is not the sigmoid flexure alone which is distended. The dilatation is not due to paralysis and atony alone, since so many cases develop in apparently healthy children, and so many autopsies show, in fact, hypertrophy of the intestinal walls. It cannot be said, on the other hand, to be due to congenital over-development of the walls of the colon, causing rigidity, since not every case has shown sufficiently marked hypertrophy, and, in any event, there is no proof that the hypertrophy is not a secondary development. It is not due to colitis, since statistics indicate that colitis is a terminal condition only. In fact, the term idiopathic expresses rather our state of ignorance, for there must naturally be some cause for the faulty tendency to dilatation

[1] St. Bartholomew's Hospital Reports, 1884, xx. 20.
[2] Transactions of the Pathological Society of London, 1854, v. 174.
[3] Lancet, 1898, i. 276.

in these cases. As to what this may be, however, we can do no more than theorize.

The term "congenital," too, requires comment, since it has been used by writers with different significations. I have employed it to designate not only an actual dilatation present at birth but also the existence of a congenital tendency to early dilatation, the latter condition being probably much the more common. With this definition in mind we can understand how some cases—those of the severest type—suffered distention and constipation, from earliest infancy, as soon as food began to enter the colon, and rapidly grew worse; others, with a less grade of the disease, resisted distention decidedly for a time or tolerated it well, although showing great lack of expulsive power always; and still others had periods of improvement, in which the distention largely disappeared, although the faulty nature of the colon remained, and relapse occurred later in nearly every instance.

It is impossible, however, to draw a sharp and always applicable line of distinction between congenital idiopathic cases and those which are not so. In the absence of an autopsy we cannot affirm positively that no stenosis existed, even though we may have reason to believe it. So, too, in cases in which the early history is incomplete or unsatisfactory, it is impossible to be sure that the symptoms were present from birth or soon after. Again, in cases in which the symptoms were clearly somewhat late in appearing we cannot always conclude with certainty whether the constipation present was a cause or a result of the dilatation. Consequently the cases selected as illustrations of idiopathic dilatation of the colon, and on which classifications have been based, differ with writers, and are not always the same, according as the writer's conception of the definitions of idiopathic and congenital differed. I have therefore studied the originals of all the published reports of cases as far as these are known to me, and, that those interested may judge for themselves, I have avoided the tabulation of symptoms or mere enumeration of cases, but have given abstract synopses of those cases which seemed to have any claim whatever to be regarded as congenital idiopathic dilatation of the colon. In a secondary list, not used here for purposes of study and analysis, I have mentioned briefly most of the other cases quoted in medical literature, but which, for reasons given with each, it would seem should be excluded from this category. It should be stated that although most of these cases have been called idiopathic, they are not commonly described as congenital.

Before giving the synopses I wish to relate the following history of a case once under my own observation:

Roy S., born June, 1894, and aged, at the time of examination, two years and eleven months. The family history was good. He had never been ill except for constipation, which he had more or less since birth,

and for which very strong purgatives were required. When he was five months old marked distention of the abdomen began, with more or less pain nearly all the time. The child would sometimes go as long as a week before a movement could be obtained, but would then have diarrhœa for several days, with even increased gaseous distention of the abdomen. This condition persisted with little change until November, 1896, except for about a couple of months of each of his two summers, at which times the bowels would move naturally. In November, 1896, being then about two years and five months old, he was supposed to have swallowed a campaign button, and all purgative medicine was stopped for a week, after which it seemed well-nigh impossible to procure an evacuation, and the child had such pain and was so swollen that the parents "feared he would burst." Relief was obtained, at least to a degree, by the use of a rectal tube, which allowed the gas to escape; but the necessity of using the tube often daily, and of giving purgatives and enemata, persisted, and finally the procedures ceased to give much relief. He was brought to the hospital of the University of Pennsylvania, May 21, 1897.

FIG. 1.

The following notes are abstracted from the clinical history:

Condition on Admission. The patient is a well-nourished child, slightly pale, intelligent, and bright. The abdomen is enormously protruding, tympanic everywhere upon percussion, and measures 63.5 cm. (25 in.) at the umbilicus and 69.8 cm. (27½ in.) at the most prominent portion. (Fig. 1.) The umbilicus is pouting, and active peristaltic movements can be seen. The outline of the greatly enlarged colon is at times distinctly visible. No tumor can be felt anywhere. There is a large amount of veining over the trunk. The costal margin is very much everted by the pressure of the gas in the bowels. Ordered hot fomentations to relieve pain, the insertion at times of a rectal tube, enemata of soap and water, followed by some containing turpentine and sometimes asafœtida. Milk diet was given.

May 22d. The child retained the enemata for some hours, and finally passed a large bowel movement, which reduced the size of the abdomen a trifle.

23*d.* Strychnine ordered internally.

June 7th. The child has continued in much the same condition, and there has been vomiting on two or three occasions. A daily enema of milk of asafœtida has been given, and the milk diet continued, with, later, a little beef-juice added. Hot fomentations have been employed frequently, also high, laxative enemata, which relieved the distention slightly. There is not much pain, and the child is bright, but homesick. Yesterday morning he developed slight, watery, greenish diarrhœa. About 5 P.M. he grew irritable and had slight pain; the temperature rose by evening to 105.2° F.; pulse

140, respiration 37. Local antipyretic measures were ordered, with whiskey, digitalis, and quinine. The diarrhœa continued, and last night there were ten stools. The abdomen is tense, and the child has some pain. The temperature is less this morning and the abdomen is smaller, but it still measures 58.4 cm. (23 in.) at the most prominent part. Paregoric ordered.

9th. Fever has persisted. The abdomen now measures 68.6 cm. (27 in.) at the umbilicus and 72.4 cm. (28½ in.) at the most prominent portion. The diarrhœa is gradually lessening, but the child refuses nourishment and is losing ground. Enemata and strychnine stopped and bismuth ordered.

11th. As the condition grew worse through failing strength and continued great abdominal distention, operation was advised. Right inguinal colotomy was done by Dr. John Ashhurst, Jr., the colon being opened shortly beyond the cæcum. A large amount of semi-liquid feces and of gas came away through the opening after an injection into it, and the abdomen became much more relaxed.

16th. During the rest of the eleventh and upon the following day a large amount of fecal matter was passed through the artificial anus, and the abdomen went down nearly to its natural size. The patient's general condition seemed at that time fairly good. The abdomen did not again become distended, but the child gradually failed in strength and died to-day.

The body was removed to the home of the parents and an autopsy performed there by Dr. R. J. Hillis, the physician who had sent the boy to the hospital. He reports that nothing was found abnormal in the belly except a marked constriction, about 25.4 cm. (10 in.) in length, situated in the ileum shortly above the cæcum. There was a small quantity of fecal matter above this. The ileum was not distended. There was no constriction found in the colon, and the abdomen was collapsed. No measurements of the colon were made, or any observation on the character of the intestinal walls.

I have seen a second case, which I believe to have been of the same nature as the one just described, although I do not include it as such, for want of a satisfactory clinical history. The child suffered from habitual obstinate constipation, and had an enormously distended, tympanitic abdomen. It was seen a number of years ago in the medical clinic of the University of Pennsylvania, and was made the subject of a lecture by Dr. William Pepper. I had a photograph of it taken on the day of its single visit to the hospital. (Fig. 2.) The presence of peritonitis was excluded, and the case was supposed to be one of extreme atony of the bowel. I now believe it to have been an idiopathic dilatation.

The following are the synopses of the cases which may with reason be considered congenital idiopathic dilatation of the colon. It will be noticed that the word "colon" has frequently been used by the writers to designate the large intestine, in contradistinction to the rectum and sigmoid flexure. In other instances it includes the sigmoid flexure as well as the rest of the colon. Each abstract shows what the writer has

intended in this respect as far as he has made his meaning clear. The age given is in nearly every instance that of the patient when first coming under continued observation. The "history" details the condition up to this time, while the result of the examination and of the continued observation is described after the words "under observation."

FIG. 2.

Henoch. (*Beiträge zur Kinderheilkunde*, 1861, 123.) *History.* Boy, aged one and three-quarter years. Great distention of abdomen, with constipation on the third day after birth. Condition continued, constipation sometimes lasting eight days; tympanites; purgatives of little use; enemata better; passage of syringe nozzle best, this bringing away large amounts of gas and feces, always soft, with considerable lessening of girth. *Under observation.* No obstruction discoverable in rectum. Under continued medication grew much better; daily stools; abdomen much smaller. But symptoms returned after treatment stopped. Child lost sight of.

Peacock. (*Transactions of the Pathological Society of London*, 1872, xxiii. 104.) *History.* Man, aged twenty-eight years. Constipated from birth; purgatives, and, later, enemata always required. Worse after a severe attack at seventeen years. Flatulence annoying and abdominal distention often great. Obstruction set in six weeks before death; relieved, but returned; belly enormous; flatus passed in large quantities; died unexpectedly. *Autopsy.* Large intestine from cæcum to upper rectum enormously distended, 15 to 20 cm. (6 to 8 in.) in diameter, containing semi-solid feces; ulceration of mucous membrane. Ileum somewhat distended; rectum healthy.

Gee. (*St. Bartholomew's Hospital Reports*, 1884, xx. 19.) *Case I. History.* Boy, aged four and one-half years. At three months difficulty in defecation began, with hard stools. At twelve months swelling of abdomen began and constantly increased. *Under observation.* Great abdominal distention; coils of intestine visible; great dyspnœa; constipation, relieved by enemata; rectal tube brought away gas and gave some relief, the abdomen growing smaller. Lived a few weeks. Diarrhœa before death. *Autopsy.* Great elongation and enormous distention of sigmoid flexure; 10 cm. (4 in.) in greatest diameter; walls thickened. Sigmoid formed two huge sacs, connected by a narrow strip of bowel. Rectum distended; colon natural.

Case II. History. Boy, aged four years. Great distention since one month old; habitual constipation. *Under observation.* Extreme tympanitic distention; hard feces felt in rectum. Died soon after. *Autopsy.* Distention of colon, especially of upper part of sigmoid flexure. Contraction of rectum

and of lower part of sigmoid below a hard concretion. Semi-liquid feces above this; no real stenosis.

There appears no evidence that the concretion caused obstruction and diiatation, and this is apparently Gee's opinion also.

Bristowe. (*British Medical Journal*, 1885, i. 1086.) *History.* Girl, aged eight years. "Long been subject to constipation of the bowels." No stool for fully seven weeks; latterly constant vomiting. *Under observation.* Distended abdomen, growing more so; no pain or tenderness; absolute constipation in spite of treatment; lived three weeks. *Autopsy.* Coils of distended intestine outlined through abdominal walls. After incision sigmoid flexure and descending and transverse colon found greatly distended, 7.6 to 9 cm. (3 to 3½ in.) in diameter. Ascending colon, cæcum, and small intestine also distended, but less so. Rectum distended to 5 cm. (2 in.) above anus. No stricture; thickening of muscular coat of large intestine; some ulceration of mucous membrane. Large intestine full of thick, semi-solid feces. Hardened mass above anus. No flatus.

Bristowe attributes the condition chiefly to the acute obstruction; yet the history of constipation for years, with the presence of marked hypertrophy of the walls of the colon, point strongly to a congenital origin.

Cheadle. (*Lancet*, 1886, ii. 1117.) *History.* Boy, aged three years. Tumidity of abdomen and obstinate constipation began at three months. All purgatives failed in turn; stools dry and hard; for two years almost never a stool without enema. Sometimes colon retained two or three enemata given in one day. *Under observation.* Abdomen greatly distended, especially in position of colon below ribs; girth 59 cm. (23¼ in.); tympanitic. Under treatment with mild laxatives and tonics improved, and recovery about complete, with daily stool, in two months.

Fütterer. (*Virchow's Archiv*, 1886, cvi. 555.) *History.* Boy, aged fourteen years. Abdomen distended from birth and grew larger slowly, but last year rapidly. Bowels moved about three times a day spontaneously. *Under observation.* Enormous abdomen, 91 cm. (35⅞ in.) in girth; tympanitic; no vomiting. Distention somewhat diminished by daily injection. Exploratory operation; nothing done; death. *Autopsy.* Sigmoid flexure distended into a huge sac; wall hypertrophied; no ulceration. Colon and rectum not distended. Passage from rectum into sac distorted, so that obstruction by pressure was produced.

Fütterer regards the case as an instance of true congenital malformation of the sigmoid flexure, which makes the propriety of including it in this list somewhat doubtful.

Hughes. (*Transactions of the Pathological Society of Philadelphia*, 1887, xiii. 40.) *History.* Boy, aged three years. Obstinate constipation in infancy; abdomen gradually grew larger and constipation worse; stools only after laxatives, but never hard. After entero-colitis at two years constipation more obstinate, and once lasted nineteen days. *Under observation.* Abdomen enormously enlarged; peristalsis of intestine visible; tympanites; no stool for twenty-four days. Improved; then severe diarrhœa and death. *Autopsy.* Colon and upper rectum greatly distended, especially latter and lower colon, which measured 10 cm. (4 in.) in diameter. Walls much thickened; ulceration in mucous membrane.

Hirschsprung. (*Jahrbuch für Kinderheilkunde*, 1888, xxvii. 1; *Pädiatrische Arbeiten; Henoch's Festschrift*, 1890, 78.) *Case I. History.* Boy, aged eight months. Constipated from birth; purgatives failed, and only repeated enemata produced evacuation. Constipated habit continued, and all sorts

of remedies required to obtain evacuations, which were of normal color and consistence. Health good otherwise. Abdomen moderately distended; scybalæ felt in rectum; once only one stool in fourteen days. Lost health. *Under observation.* Never stool without aid; those obtained were of normal appearance. When constipated abdomen became enormously swollen, this disappearing for a brief time after opening bowels. Occasional vomiting; sound passed easily into rectum. Later unassisted movements, followed by great abdominal swelling, profuse diarrhœa, and death at eleven months. *Autopsy.* Great dilatation of sigmoid, and especially of transverse colon; wall thickened; ulcerations present. Rest of colon widened; rectum natural. No constrictions.

Case II. History. Boy, aged seven months. Constipated from birth; stool only by purgatives; no pain; no vomiting; abdomen at times greatly distended, and this gradually increased. At six months puncture with trocar. Then lost health; had diarrhœa and occasional vomiting. *Under observation.* Abdomen 56 cm. (22 in.) in circumference; peristalsis visible; profuse diarrhœa and wasting persisted until death in four or five weeks, and abdominal distention until shortly before. *Autopsy.* Great distention of sigmoid flexure and transverse colon; hypertrophy of walls; ulceration of mucous membrane.

Case III. History and observation. Boy, aged two and one-half months when he died. No stool from birth. Seen on third day, with much distended and tense abdomen. Passage of finger into rectum brought a stream of meconium out. Constipation continued, with never spontaneous stools; then more frequent stools with purgatives; then spontaneous stools; no actual diarrhœa. Abdomen always somewhat, and at times greatly, distended, with coils of intestine visible. Distention increased; health failed; no vomiting until day before death; never much pain. *Autopsy.* Distention of cæcum and ascending, transverse, and descending colon and sigmoid flexure. Hepatic and splenic flexures narrower. Walls of colon thickened; no ulceration; no strictures. Colon nearly empty.

Case IV. History. Boy, aged ten years. From the time he was little he had constipation, distended abdomen, occasionally abdominal pain, usually ending in expulsion of feces and gas, exceptionally vomiting. *Under observation.* Enormous distention of abdomen; tympanitic; not tender; feces in rectum; no stool for eight days. Continued treatment with enemata produced evacuations of bowels and diminution in size of abdomen, though girth still 63 to 67 cm. (24¾ to 25¾ in.). Had periods of spontaneous stools, not hard, sometimes thin. Six months later in fair health, but never a stool without enema.

Formad. (*University Medical Magazine*, 1892, iv. 625.) *History.* Man, aged twenty-nine years. Large abdomen and frequent constipation to one and one-half years of age. Then distention and constipation became worse. As he grew up constipation would sometimes last a month. Abdomen increased constantly in size; tympany. Later, pain, dyspnœa, weakness. At twenty years he became a museum freak ("balloon man"). Died suddenly on water-closet. *Autopsy.* Abdomen measured 220 cm. (86½ in.). Whole colon, especially transverse, distended with gas and semi-liquid feces, measuring 25 to 76 cm. (10 to 30 in.) in circumference; no thickening of walls; no kinking or other stricture; no impaction. Rectum and small intestine normal.

Hadden. (*International Clinics*, 1893, iv. 53.) *History.* Boy, aged eleven weeks. Bowels natural until three weeks old, when symptoms began (pain, vomiting, constipation, distention) and continued. *Under observation.* Abdomen greatly distended; peristalsis visible. Treated for three weeks, then stool obtained, but child died of exhaustion. *Autopsy.* Distention of last 61 cm. (24 in.) of small intestine and of colon up to sigmoid flexure. Mucous membrane ulcerated; no stricture.

Walker and Griffiths. (*British Medical Journal*, 1893, ii. 230.) *History.* Boy, aged eleven years. Distention of abdomen noted when a few weeks of age; increased rapidly, and by three years was enormous. Bowels acted regularly until three years; then always constipation, relieved by enemata. Always dyspnœa; little pain generally; latterly more. Occasionally pas-

sage of large amount of gas relieved the distention. Died suddenly while receiving enema. *Autopsy.* Girth of abdomen, 119 cm. (47 in.). Colon enormous, especially transverse and descending portion, 58 cm. (23 in.) in circumference; contained soft feces. Rectum, small intestine, and lower part of sigmoid normal. No constriction. Walls of colon much thickened; chronic inflammation of mucous membrane.

Osler. (*Archives of Pediatrics*, 1893, x. 111.) *History.* Boy, aged ten years. Always prominent abdomen; for years trouble with bowels. *Under observation.* Abdomen 63 cm. (24⅘ in.) in girth; tympanitic; not tender; some pain. Coils of intestine visible. Generally constipation, easily relieved; occasionally diarrhœa; some vomiting. Laparotomy showed "entire gut enlarged," especially the sigmoid flexure, which measured 45 cm. (17⅘ in.) in circumference. Walls much thickened; no stricture or impaction. Artificial anus made; fluid feces and gas escaped; distention entirely relieved. Recovery. No return of symptoms during several years; then lost sight of.

Mya. *Case I.* (*Lo Sperimentale*, 1894, xlviii. 215.) *History.* Girl, aged two and one-half months. Vomiting, distention of abdomen, and constipation began day after birth; stool only after repeated injections. Then tumefaction persisted, with constipation for eight days, and frequent vomiting. *Under observation.* Abdomen 45 cm. (17⅘ in.) in girth. Rectal tube passed readily. By enemata obtained passages with tolerable regularity. Seen again at eight and one-half months, with return of constipation. Abdomen 53 cm. (20⅘ in.). The emptying of lower bowel, especially of gas, produced partial diminution in girth, but vomiting not entirely arrested. Child lost sight of.

Case II. History. Boy, aged five and one-half months. Twenty-four hours after birth swelling of abdomen began and constantly increased. Stools only every four or five days with enemata. Twice no stool for eight days, then vomiting and finally diarrhœa. *Under observation.* Distended abdomen, girth 52 cm. (20½ in.); tympanitic. Sound removed quantities of gas, with some diminution in size. Later developed diarrhœa, with rapid diminution in girth. Died collapsed. *Autopsy.* Large intestine everywhere thickened. Mucous membrane ulcerated. Colon irregularly distended; transverse colon most dilated, measuring 16 cm. (6⅓ in.) in diameter.

Generisch. (*Jahrbuch. für Kinderheilkunde*, 1894, xxxvii. 91.) *History.* Girl, aged one and one-quarter years. No stool after birth. On second day abdominal distention began; increased greatly. First stool on eighth day of life, after purgatives, and abdomen then grew smaller. Later often long periods of constipation; occasionally vomiting. *Under observation.* Abdomen enormous, 59 cm. (23½ in.) in girth; tympanitic; outline of dilated colon visible; sound removed gas and lessened distention; a week before stool obtained. Later, spontaneous, soft stools, with some diminution in size of abdomen; then return of symptoms; finally diarrhœa, vomiting, and death after three months of observation. *Autopsy.* Colon much distended, 8 to 11 cm. (3 to 4⅜ in.) in diameter; walls thickened; mucous membrane ulcerated. Transverse colon largest; sigmoid flexure partly distended, passing into a narrower portion. Bowel contained soft feces.

Rolleston and Haward. (*Transactions of the Clinical Society of London*, 1896, xxix. 201.) *History.* Boy, aged twelve years. Distention of abdomen began at two months. Was subject to gradually increasing constipation; often no stool for several days or even weeks, and then would be very ill and have much distended abdomen. Last two years often vomited. *Under observation.* Abdomen enormously distended; tympanitic; peristalsis visible. Obstinate constipation, with distention and abdominal distress, alternated with daily movements, with relaxation of abdomen. Hard feces in rectum at times. Watched three months. Died in one attack. *Autopsy.* Descending colon and sigmoid flexure greatly distended; rest of colon and first part of rectum less so; no stricture. Walls of colon hypertrophied; mucous membrane ulcerated.

Martin. (*Montreal Medical Journal*, 1897, xxv. 697.) *History.* Boy, aged three and one-half years. No stool until five days old. Later always con-

stipated, sometimes going eleven days. Enlargement of abdomen began at one year, and steadily increased, with occasional lessenings following escape of flatus. Latterly slight pain. Stools scybalous; later semi-solid; two intermittent attacks of diarrhœa. *Under observation.* Great distention, girth 68 cm. (26¾ in.). Coils of intestine and vermicular movements visible; tympanites; no tenderness; rectum normal on digital exploration. Exploratory operation done; no stricture found; wound closed. Second laparotomy two weeks later; intestines punctured by trocar; death in a few days. *Autopsy.* Perforative peritonitis. Sigmoid flexure elongated; enormously distended; 38 cm. (14 9/10 in.) long, 5 to 8 cm. (1 9/10 to 3 1/10 in.) in diameter; contained solid feces; walls thickened; no ulceration; partial narrowing of lower portion through possible thickening of mesocolon. Rectum normal. Descending colon somewhat dilated and much thickened.

The narrowing in this case does not appear to have amounted to a stenosis.

Hichens. (*Lancet*, 1898, ii. 1121.) *History.* Man, aged twenty years. Constipated "from the day of his birth until the day of his death." Abdomen always greatly distended; purgatives and enemata always needed; stools only every ten to fourteen days, and then scybalæ, followed by several loose movements. Sudden death. *Autopsy.* Abdomen enormous. Sigmoid flexure enormously distended and much elongated; 57 cm. (22½ in.) long, 35 cm. (14 in.) in smallest circumference; contains gas and semi-liquid feces. Walls much thickened; slight distention of colon; no stricture anywhere.

Hobbs and de Richemond. (*La Médecine Moderne*, 1898, ix. 652.) *History.* Girl, aged two and one-half years. Considerable enlargement of abdomen, giving rise to difficulty in extracting child at birth. After birth evacuation of bowels always difficult; vomiting for three months; abdomen continued to grow larger; purgatives and enemata of little effect. *Under observation.* Enormous abdomen; tympanitic. Sound entered rectum easily 25 cm. (9¾ in.); brought away feces on its end. Puncture with small trocar allowed 3½ litres of gas to escape, but abdomen soon filled again. Watched over a month. No improvement. Operation advised. Child disappeared.

Cases not to be included for reasons stated with each. Most of them mentioned in lists by other writers, who have not necessarily designated them as congenital.

Banks. (*Dublin Journal of Medical Science*, 1846, i. 235.) Man, aged fifty years. Had had some former attacks of same kind. This acute and fatal. No reason to consider case congenital.

Chapman. (*British Medical Journal*, 1878, i. 566.) Specimen only. Subject aged fifty-eight years. No history.

Money and Paget. (*Transactions of the Clinical Society of London*, 1888, xxi. 103.) Adult, aged fifty-five years. Clearly not a congenital case. Fatal.

Little and Callaway. (*Transactions of the Pathological Society of London*, 1851, iii. 106.) Adult, thirty-four years of age; imbecile; inordinate appetite. Died from acute constipation and over-distention of abdomen. Every reason to believe acquired.

Goodhart. (*Transactions of the Clinical Society of London*, 1881, xiv. 84.) Girl, aged seventeen years. Well until eight months before. Clearly secondary to anæmia.

Bristowe, second case. (*British Medical Journal*, 1885, i. 1086.) Man, aged twenty-four years. For "some long time" subject to constipation. No history of any congenital dilatation. Died of peritonitis.

Morris. (*British Medical Journal*, 1886, ii. 1211.) Woman, aged twenty-four years. Acute attack. Recovery. No reason to suppose congenital.

Wallmann. (*Virchow's Archiv*, xiv. 202) Man, aged sixty-six years. Several true diverticula. Not like congenital idiopathic dilatation as here understood.

Ammon. (*Angeborene chirurgische Krankheiten*, S. 39. Atlas.) Specimens from bodies of new-born or fœtus; some clearly with stenosis. No histories given, although pathologically some exhibit the characteristic lesions.

Vulpian. (*Gazette des Hôpitaux*, 1877, No. 75.) Case of dilatation, with narrow anus.

Lacave. (*Verhandl. van het Genootschap ter Bevord. der Genees en Heilkunde te Amsterdam II. Deel.* 1 *Stuck*, 1858, 7.) Clearly result of atresia ani.

Gruber. (*Virchow's Archiv*, 1872, lvi. 432.) Autopsy specimen. Probably acquired dilatation, with congenitally abnormal length.

Ebers. (*Hufeland's Journal*, August, 1836, lxxxiii. 62.) Male, aged seventeen years. Symptoms rather of acute obstruction, although always constipated habit; yet no history of distention. No reason to assume was congenital.

Wells. (*Transactions of the Society for Improvement of Medical and Surgical Knowledge*, 1812, iii. 158.) Man, aged fifty-eight years. Acute symptoms; no history of previous attacks.

Lewitt. (*Chicago Medical Journal*, 1867, xxiv. 359.) Man, aged twenty-one years. First attack at twelve years. No evidence that case was congenital.

Harrington. (*Chicago Medical Journal and Examiner*, 1878, xxxvi. 400.) Man, aged fifty-one years. Acute attacks; probably old dilatation; but no symptoms of congenital affection.

Herringham and Clarke. (*St. Bartholomew's Hospital Reports*, 1895, xxxi. 57.) First case. Man, aged seventy years. Dilatation probably old, but no proof that it was congenital. Second case. Child, aged four months. Began as colitis; dilatation appears to have been secondary to this.

De Haen. (*Ratio Medendi*, iv. Cap. iii.) Quoted by Gee. Chapter III. refers to cases of drowning. Reference clearly wrong. Chapter IV. has some cases involving dilatation of colon, but none to be placed in this category.

Parry. *Posthumous Works*, vol. ii. 380.) Man, died of constipation apparently. No history of a congenital origin.

Gay. (*Transactions of the Pathological Society of London*, 1854, v. 174.) Boy, aged seven years. Condition followed an attack of typhus; probably result of this, and therefore acquired.

Eisenhart. (*Centralblatt für die innere Medecin*, 1894, 1153.) Woman, aged fifty-three years. Appears to have been an acute abdominal dilatation resulting from chronic constipation; no history of early distention.

Strahan. (*Lancet*, 1893, ii. 1245.) Man, aged thirty-two years. Lunatic. No history of abdominal distention. No reason to regard colonic dilatation as congenital.

Lespinasse. (*Journal de Médecine de Bordeaux*, 1888–1889, xviii. 427.) Woman, aged seventy-eight years. Enormous distention of sigmoid. No evidence of congenital origin.

Favalli. (*Gazetta medica di Milano*, 1846, v. 213.) Man, aged fifty years. Acute case; no history of early distention.

Berti. (*La Pediatria*, 1894, iii. 136, 161.) First case. Seen by Porro. Congenital dilatation, but associated with imperforated anus. Second case. Child, aged thirteen months. Autopsy showed dilatation of sigmoid flexure, which may have been congenital, but symptoms entirely wanting. No constipation. No abdominal distention until last day of life. Third case. Boy, aged two months. Autopsy showed long sigmoid, with saccular dilatation of a portion of it. Appeared like a congenital malformation, but never any symptom during life. Died of marasmus.

Cheadle. (*Lancet*, 1886, ii. 1107.) Boy, aged five and one-half years. Constipated habit only for last nine months, then abdominal distention. Recovered entirely. Case apparently result of temporary atony. No reason to regard as congenital.

Osler. (*Archives of Pediatrics*, 1893, x. 111. Second Case.) Child of seven years. Supposed to be idiopathic, but autopsy two years later (personal communication from Dr. Osler) showed stenosis of sigmoid flexure.

The cases of Berti's are the only ones in this list which might with any reason be included in the first list; but as we are considering a

clinical condition as well as an anatomical one it is better to exclude them from it.

A glance at the history of Roy S. and at the synopses of the published cases, a total of twenty-four in all, shows a very characteristic group of symptoms. Chief among them and first to appear are two—viz., constipation and abdominal distention. In twenty-two of the cases one or both of these was witnessed within three months, and nearly always within a few days after birth. In two cases (Bristowe's and Formad's) the time is not distinctly stated. Generally it is noticed that within a few days after birth the child tends to be much constipated. In some cases this has been complete and obstinate, and only relieved after repeated administration of purgatives or enemata. In other cases therapeutic means have been more promptly successful. In a few, as in the cases of Hadden, Rolleston and Haward, Cheadle, and in one of Gee's, several weeks or even as long as three months appear to have elapsed before the trouble with the bowels began. In Fütterer's patient there was never constipation. In nearly half the cases constipation was the first symptom noticed, although in most of these distention of the abdomen developed very soon after.

In almost all of the remaining cases the development of constipation and of distention seems to have been simultaneous. There are, however, some exceptions to this. Thus in a few cases abdominal distention was quite late in developing. For instance, in Martin's patient and in the first of Gee's there was no distention until the age of one year, although constipation began much before. In my patient distention was not noticed until the age of five months. In a very few cases the history seems to indicate that the development of abdominal distention has antedated that of constipation. The only certain instance of this, however, and the most marked, is that of Walker and Griffiths, in which distention was noted at a few weeks of age and constipation not until three years. The degree of distention has varied much according to the case, but always seems to have been very marked. Frequently its degree has depended to a considerable extent upon the degree of constipation. The relief of constipation by enemata or purgatives would in most instances be attended by a decided diminution in the size of the abdomen. On the other hand, in my own case attacks of diarrhœa seemed to produce little diminution in the abdominal girth. Often nothing has given such relief to the distention as the evacuation of gas through a rectal tube. The abdominal distention was always tympanitic. Frequently the outline of the distended colon could be perceived through the thinned abdominal walls, and peristaltic movements were visible.

Particularly in the cases which have survived the first year or two of life there has been a decided tendency to repeated attacks, or rather

exacerbations. In these constipation, though always troublesome and constantly growing more so, became more extreme and the abdomen more distended. With rare exceptions it has been only in such attacks that pain or vomiting has been a prominent feature. As a rule, pain and tenderness have been slight or absent, and vomiting only occasional.

As to the character of the stools, it seems only exceptional that they have been scybalous. Henoch, for instance, calls attention to the fact that the insertion of a rectal tube in his patient always brought away feces which were soft. In one of Hirschsprung's cases there had been no stool since birth, yet the finger introduced into the rectum produced the discharge of a stream of meconium. These are examples only of the usual condition. At autopsy, too, the feces in the colon have been nearly always in a semi-liquid state. Hard, fecal masses have been the exception. In fact, everything points to an inability of the colon to propel its soft contents rather than to a blocking by hard masses.

Not infrequently there have been attacks of diarrhœa, and it is especially noteworthy that in a number of instances severe diarrhœa has been a terminal symptom.

The general health has always suffered sooner or later, although in a few instances not for a considerable time. Dyspnœa is liable to be produced by the pressure against the lungs.

It is interesting to note that twenty of the cases have been male and only four female.

The prognosis, while not totally bad, is most unfavorable. Eighteen of the twenty-four cases are known to have terminated fatally. Only three of these—those of Peacock, Formad, and Hichens—are known to have reached adult life. The remaining died in infancy and childhood—the oldest at the age of fourteen years, eleven of them before the age of five years, and six of these before that of three years. Only two patients—those of Cheadle and of Osler—can be said to have recovered, the latter consecutive to the formation of an artificial anus. When heard of some years later he was, I believe, doing well (personal communication from Dr. Osler). The four remaining non-fatal cases disappeared from observation—one of them somewhat improved, the other three not at all so.

Eighteen autopsies and one laparotomy on a case which recovered show a striking uniformity in the principal features of the pathological anatomy of the disease. In all there was dilatation of more or less of the large intestine, generally described as "enormous." There seems to be an erroneous opinion in some quarters that it is the sigmoid flexure which is chiefly or solely dilated in this disease. I wish to call particular attention to the fact that there are but two cases described—Fütterer's and one of Gee's—in which this appears to have been the only portion of

the colon dilated; and but two others—Martin's and Hichens'—in which the remainder of the colon is said to have been but slightly involved. In all the remaining, with one exception, both sigmoid flexure and the rest of the colon were much dilated; sometimes the sigmoid flexure most (Gee, Osler); sometimes some other part of the colon most (Hirschsprung, first case; Formad, Mya, Generisch). In the one exception referred to, that of Hadden's case, the colon, without the sigmoid flexure, was involved. In a few cases the rectum was distended in a portion of its course. The small intestine was never distended to any considerable extent.

The degree of dilatation of the colon has been often enormous. It has sometimes appeared at autopsy to fill the whole abdominal cavity, crowding everything else out of sight. A very characteristic pathological feature has been the thickening of the walls of the colon. This has been reported in nearly every case. Only in Formad's is it stated to have been absent. In a few others it is not referred to (Peacock, Gee, second case). In my own case no observation was made regarding it. Generisch is disposed to regard the thickening as an early change, and as one of the causes of the loss of peristaltic power. It seems, however, just as likely—certainly in many cases—that it is a later change occurring in an effort at compensation. Ulceration of the mucous membrane is another alteration quite often seen. It is doubtless a later change and not a necessary one. It was nearly always found in cases in which severe diarrhœa had terminated life.

The diagnosis is easily deduced from the symptoms detailed. It rests upon the very early presence of troublesome constipation; the development with this, soon after, or rarely before, of great tympanitic abdominal distention; the discovery often of the distended colon outlined through the abdominal walls; the absence of evidence that the constipation is due to impaction; the absence of any discoverable organic obstructive cause, as shown by the exploration of the rectum and colon; the absence of any previous debilitated state of health which might occasion colonic atony; and, finally, the confirmation by an autopsy that no structural obstruction of the intestine was present. This last, although, of course, a "post-mortem diagnosis," is often indispensable. As pointed out at the opening of this article, it is sometimes impossible—as in many other diseases—to make an infallible diagnosis without autopsy. A sharp diagnostic line between idiopathic and obstructive congenital cases cannot always be drawn.

Treatment can only be (1) hygienic and medicinal and (2) operative. In the first class improvement of the general health is indicated, since this may help to increase the peristaltic power of the colon. Massage has been recommended by some, and condemned by others, on the ground that it may produce perforation of ulcerated spots. Carefully performed in

cases without diarrhœa or tenderness, it seems indicated. Electricity may be used for the same purpose. Means must be employed to empty the bowels either by purgatives or enemata. Objections exist to the use of either, since eventually they tend to weaken still further the muscular power. In the case of Hughes the child seemed to be made distinctly worse by enemata. Yet it is often a case of "needs must," and that remedy has to be selected which best unloads the bowels and gives relief. The use of the rectal tube to remove gas has sometimes been a great comfort to the patient. In three instances — Martin's, Hobbs' and de Richemond's, and one of Hirschsprung's—puncture of the intestine with a fine trocar has been performed, in order to allow gas to escape.

In any severe case tending to grow worse seasonably early operation of some sort is to be advised. In spite of the gravity of the procedure, not to employ it seems still more grave. Exploratory laparotomy was performed on the patients of Fütterer and Martin, but nothing more radical was attempted. An artificial anus was made by Halsted in Osler's case, and the child recovered. The same operation was performed in my own case. Had it been done earlier, before the rapid failure of health set in, the chance of recovery would have been greater. The operation done by Treves (*loc cit.*) on a child with dilatation consecutive to congenital stenosis might well be employed in idiopathic cases—viz., the entire removal of the functionally useless dilated colon and the joining of the small intestine with the anus. As this is a serious operation the attempt to relieve by the formation of an artificial anus may well be made first.

ON THE TOXICITY OF THE URINE.[1]

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The question of the toxicity or non-toxicity of urine has been engaging the attention of scientists for a long time, and the number of authors who have contributed to this subject is very great. From a practical point of view the subject has received its greatest impetus by

[1] Read at the meeting of the Association of American Physicians, May, 1899.

the appearance of Bouchard's charming book,[1] Paris, 1885; translated, with a preface, by Thomas Oliver. Philadelphia and London, 1894.

Without going into a chemical discussion of the agents producing toxicity of urine, this work has offered to us a simple, practical test, which consists in injecting a quantity of urine proportionate to the weight of the animal; if the animal dies the urine is toxic; if not, there is no toxicity. Now, to those of us who believe in auto-infection as an important etiological factor in disease, this test was very welcome; first, because it appealed to us on account of its simplicity; and, secondly, because it seemed to give us an index as to the prime cause of the diseased condition of our patient. It could not be final or complete, because of the fact that the substances which produce toxicity in urine had not been isolated, and, therefore, their origin in the body not disclosed. But, under all circumstances, this test seemed a valuable one for clinical purposes, and, probably, more exact than many others upon which diagnoses are based. As this paper has not been prepared as a literary digest of the subject, but simply to determine a method by which the toxicity of urine can be determined, and to discuss conclusions arising from the comparatively large number of experiments made, we will be justified in beginning with Bouchard. Bouchard's method consists in injecting, in the rabbit, from 30 to 60 c.c. (average 45 c.c.) per kilo of animal into "the posterior marginal vein on the dorsal part of the face as it spreads over the ear." (Bouchard, *loc. cit.*) "We can, even in the rabbit, penetrate directly into the median artery of the ear." He discards subcutaneous injections, because, as he has proven by experiment, absorption does not take place with sufficient rapidity. One of us[2] first began using a modification of Bouchard's methods by injecting the urine into the peritoneal cavity of rabbits under certain aseptic precautions, a method which was, afterward, fully justified by the investigations of Vollhard,[3] by whom is disclosed the fact that in intravenous injections the results are changed by the rapidity of the injection, by the pressure which is used, and, finally, that in two cases extensive thromboses were produced by urine injected intravenously. But that which finally induced us to discard the method of Bouchard and the subsequent observers was the fact that there were so many differences of opinion expressed, especially in connection with the toxicity of urine in pregnancy, and that, with one of us, experiments made with the urine of one patient gave absolutely varying results. The tentative conclusion was arrived at that it was not the observers that were at fault but the method. To prove or disprove this view,

[1] Leçons sur les Auto-intoxications dans les Maladies, etc.

[2] R. W. Stewart: Toxicity of Urine of Last Month of Pregnancy. The American Journal of Obstetrics and Diseases of Women and Children, xxxv. 3, 1897.

[3] Monatsschrift für Geburtshülfe u. Gynäkologie, Studien zur Pathogenese d. Eklampsie, 1897.

both of us began a series of experiments: the one taking the urine of pregnant women during the last month of pregnancy, and the other that of healthy subjects and of patients who could be considered from clinical manifestations, and are so considered by Bouchard, as being affected with gastro-intestinal auto-infection. Bouchard speaks of these cases as being primarily connected with dilatation of the stomach. We have failed to find the stomach dilated. These patients were:

CASE I. Female, aged thirty years, suffering with chronic constipation, headaches and hysterical (neurosal type, Bouchard).

CASE II. Female, aged forty-five years, constipation, Rigg's disease, headache, dyspepsia and recurrent urticaria.

CASE III. Male, aged fifty years, constipation, dyspepsia, asthma (asthmatic form, Bouchard).

CASE IV. Female, aged thirty years, constipation, migraine (neurosal form, Bouchard).

CASE V. Boy, aged nine years, constipation, asthma, repeated attacks of coryza, furuncles (mixed form, Bouchard).

CASE VI. Male, aged forty years, constipation, chronic urticaria (cutaneous form, Bouchard).

CASE VII. Female, aged thirty-nine years, neurasthenia, anæmia (neurosal form, Bouchard).

CASE VIII. Male, aged twenty-two years, constipation, acne vulgaris (cutaneous form, Bouchard).

CASE IX. Boy, aged eleven years, constipation, extreme nervousness, migraine (neurosal form, Bouchard).

CASE X. Female, aged twenty-four years, constipation, chlorosis.

In all we took urine from twenty-four patients, thirteen of the former class and eleven of the latter; also urine from healthy persons, and with this urine one hundred and fifty-four animals were injected. All the experiments were conducted on the strictest principles of surgical asepsis. Details are unnecessary, except to state that all the instruments, vessels, and cotton plugs were carefully sterilized by heat before being used, and the fluid used for injection was always warmed. As it was impossible to obtain as many rabbits as were required, and, as Bouchard neatly puts it, "there are economical necessities before which it is necessary to bow," white mice were used in a large number of cases. That urine under proper conditions may become toxic to white mice was abundantly proven; but, in order to be positive in regard to this, in most of the experiments the ratio of 45 to 1 kilo of animal was increased to 100 to 1 kilo, or even more; but even with this enormous increase we arrived at the distinct conclusion that urine is less toxic to white mice than to rabbits. This was due more to the fact that more mice recovered after having been made ill than rabbits. The experiment, made to show the comparative toxicity of urine upon a mouse and a rabbit, does not, however, prove this.

EXPERIMENT XLVI. November 26, 1898, urine taken from a patient during labor, 33 c.cm., injected into a rabbit.

5.03 P.M.

5.13 P.M. Peculiar nodding motion of head; throwing head to one side, rouses himself as though startled.

5.16 P.M. Head drawn backward, pupils dilated, but reacting to light; falls on one side, jerking of all extremities; then jerking confined to muscles of neck; head thrown backward with convulsive motion; some clonic movements of head, ears, and forefeet.

5.17 P.M. Breathing stopped; heart still beating.

5.19 P.M. Lies on side, apparently dead; heart still beating.

5.19¾ P.M. Heart stopped.

EXPERIMENT XLII. Same urine, 2 cc. injected into mouse at 9.10 P.M.

9.16 P.M. Drowsy, tending to fall to one side; breathing very rapid.

9.21 P.M. Violent trembling, lasting about one-half minute, then quiet, followed by trembling at regular intervals.

9.35 P.M. Wabbling gait; throws himself from side to side; trembling continues; rolling over, violent clonic convulsions, then tonic spasms with opisthotonos; seems to be struggling for breath; respiration very rapid; these cease and recur.

9.45 P.M. Death in clonic spasm.

The mice die in the same manner that the rabbits do, either quickly, in the manner just described, inside of an hour (thirty-five minutes the longest time in our experiments), or in from twelve to twenty-four hours, the symptoms then being ushered in by drowsiness, lying down in the bottom of the jar, slowness of breathing, convulsions, and then death. The post-mortems have revealed nothing microscopically that could account for death; as far as bad results from the injection are concerned, we found lesions only in two instances: in the one—a mouse—a blood clot in the omentum; in the other, a seropurulent, offensive fluid in the peritoneal cavity; except in cases in which the urine had been standing a comparatively great length of time, as will be referred to later.

The experiments began by investigating the urine passed by the patients mentioned above, in whom toxicity could be expected with reasonable certainty after reading the results of other investigators. It was shown here that in forty mice in only three the urine was toxic. Fresh urine injected immediately, boiled immediately and injected immediately, filtered urine never; but fresh urine when kept sealed to the utter exclusion of air, however, proved toxic in a number of mice when not injected immediately. There seemed to be something in the urine, then, which had the power of rendering it toxic after sufficient time had been given to cause it to develop its activity. With this in view a large series of investigations was begun with the results presented in the following table:

VARIOUS METHODS IN TESTS FOR UTERINE TOXICITY.

	Number of experiments.	*Result: deaths.*
Fresh urine injected immediately	Mice, 14	1
Filtered urine injected immediately, or after 24 hours	Mice, 21	None
Urine boiled immediately and used immediately .	Mice, 22	Mice, 2
" " " " .	Rabbits, 5	Rabbits, 2
	—27	14 per ct.
Urine boiled immediately and used after 24 hours .	Mice, 26	Mice, 10
" " " " " .	Rabbits, 5	Rabbits, 2
	—31	39 per ct.+
Urine boiled with boric acid, allowed to stand 24 hours	Mice, 11	Mice, 2
" " " " "	Rabbits. 3	Rabbits, 3
	—14	35 per ct.+
Urine mixed with boric acid, allowed to stand longer than 24 hours	Mice, 18	Mice, 5
" " " " "	Rabbits, 5	Rabbits, 5
	—23	43 per ct.
Fresh urine allowed to stand for a variable length of time longer than 24 hours	Mice, 30	Mice, 20
		66⅔ per ct.

There are, then, one hundred and fifty-four experiments to draw conclusions from, arranged in seven series:

1. In the experiments made with the fresh urine the urine was passed into sterile vessels and injected into mice within a few minutes after it was passed. It will be seen that one mouse died. This is the mouse which had the lesion in the omentum, but died as all the mice died when the urine is toxic. It is difficult to say, precisely, how much the element of shock had to do with its death, especially in view of the fact that the same urine, after it had been boiled and kept for twenty-four hours, did not kill. The only other explanation that might be offered is the one that the operation was not done under strict asepsis.

2. For the purpose of filtration, urine was passed and then immediately placed in the filtering apparatus, either Kitasato or Chamberlin. All the urine used by this method had first been tested as to its toxicity and found non-toxic. It did not matter whether it was injected immediately or kept in sealed vessels for four days, it never produced death.

3. The urine that was boiled immediately and injected immediately—twenty-seven cases in all—had been tested in twelve cases for toxicity and been found non-toxic. In fifteen cases it had not been tested, so that no conclusion could be drawn as to the comparative effect of boiling. In the twelve cases it was not changed by boiling in one way or another. In the fifteen cases it was impossible to make the experiment by injecting urine immediately drawn. The four deaths show that urine may be toxic when passed. In remains to be shown to what extent boiling reduces toxicity, if at all, on account of a possible effect upon it by ferments or other bodies, as well as by bacteria. The latter must be taken into especial consideration, because all of these specimens were taken from women immediately before, during or immediately after labor.

4. In urine that was boiled immediately and used after it had been kept the result was a peculiar one. The longer it was kept the more toxic it became. The following experiment was made to show this: 150 c.cm. was passed by a healthy individual; this was divided into eleven parts, all of which were boiled except one. This one was injected (1.5 c.cm.) into a mouse and found non-toxic; the rest were boiled and put into Erlemeyer flasks. One of these was immediately injected into a mouse and found non-toxic; the rest were injected twenty-four hours apart until all had been used. The result was death in all cases, notwithstanding the fact that the quantity of urine was reduced daily. At first the attempt was made to count the bacteria with an eye-piece micrometer, but this was very soon given up, on account of the enormous increase of bacteria. In these cases, after forty-eight hours, evidences of peritonitis were found in these mice, forming one of the exceptions to the rule stated before. The enormous mortality in this series of experiments, as compared with the general mortality (39 per cent.), is simply explained by the fact that all the other experiments were made in cold weather, from November to March, while this series was done during the very warm weather of spring (from 70° to 85° F., in the middle of the day). It seems, then, that boiling once is sufficient to kill bacteria, but not their spores; and, as in sterilizing milk, as was shown by Flügge, the spores developed and finally produced the same effects as were primarily produced by the bacteria.

5. Some authors have recommended the addition of boric acid to prevent development of bacteria; for this reason the series was instituted. Here it was also shown that little influence was exerted, and that the longer the mixture was kept the greater the mortality. In a series published by one of us (Stewart, *loc. cit.*) the mortality was 100 per cent. In this series no account was taken of time of taking urine and its injection, although the table seems to show that urine kept with boric acid does not become toxic more rapidly than urine kept and used after being boiled; this, again, is on account of the difference in outside temperature, all of the experiments being made during cold weather.

6. In regard to fresh urine which has been kept for longer than twenty-four hours, it need only be said that the largest mortality was arrived at by this method; and in some of the mice that lived longer than eighteen hours there were also present evidences of peritonitis.

As a result of these investigations we beg leave to present the following conclusions as to the method:

1. Fresh urine injected immediately can be safely used.

2. Filtered urine, immediately filtered and immediately injected, can be safely used.

3. Urine boiled and injected immediately should not be used unless

error caused by possible changes within the body of the patient be first eliminated.

4. The addition of boric acid does not give reliable results.

5. Urine should never be used that has stood for twenty-four hours.

6. The method cannot be used for exact determinations of toxicity in that a range of from 25 per cent. to 50 per cent. of error is found for individual cases.

The conclusions as to toxicity of urine can be only tentative as applied to all the cases, but they are positive for the majority. If the table be examined it will be seen that those two methods which exclude bacterial activity absolutely after the urine is passed are followed by comparatively no mortality; in fresh urine immediately used, only one death out of fourteen; in filtered urine, no deaths, even after the urine had been kept as long as four days; in urine with boric acid used before the lapse of twenty-four hours, a mortality of 39 per cent.; after twenty-four hours, a mortality of 43 per cent.; in boiled urine kept for longer than twenty-four hours, a mortality of 39 per cent.; and in fresh urine kept for longer than twenty-fours, a mortality of 66 per cent.

It would seem, then, that most of the toxicity of urine was due to the formation of substances the result of the action of bacteria upon some body or bodies in the urine. As a result of this investigation, we are not justified in stating that there is no other toxicity except that due to bacterial activity; but we are justified in making the statement that all those investigations that have been made in which this activity has been overlooked are to be regarded as inconclusive.

Finally, one of us wishes to make a scientific retraction of a statement made in a paper read before this Society. In connection with some investigations made upon chlorosis, one of us found a toxic body in the urine; this toxic body, in the light of the present investigations, was not the result of chlorosis but of a faulty method. In so far as this body has any effect upon the theory of the origin of chlorosis, this theory is hereby discarded.

THE DISEASE OF CONVULSIVE TIC (GILLES DE LA TOURETTE'S DISEASE),

WITH SPECIAL REFERENCE TO A HYPOTHESIS AS TO ETIOLOGY.

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Some confusion still exists in the classification of conscious spasmodic movements which are not manifestations of well-established clinical entities, such as Sydenham's chorea, Jacksonian epilepsy, etc. Of these

one class has been described by different authors with some, but not entire, uniformity of meaning, under the titles of habit or mimic spasm, habit chorea, spasmodic tic, convulsive tic, etc. However, when the attempt has been made to isolate the symptom-complex of conscious spasmodic movements, which is considered in this paper, the specific name employed has been Gilles de la Tourette's disease, or maladie des tics convulsifs, even in books other than French. Because I know no simpler English equivalent I have also used these names, merely translating literally into English the latter one. So much in explanation of titles, which, no doubt, appear unnecessarily long.

Gilles de la Tourette's disease, corresponding in part to habit spasm, as described by Gowers, but in reference to which Charcot, and particularly his pupils, Gilles de la Tourette and Guignon, pointed out special symptoms, is a painless nervous affection found chiefly in children from six to sixteen years of age who are of marked neurotic habit and heredity. Besides the spasmodic contraction of face muscles, notably those about the eyes and the zygomatici, but also of the trapezius, sterno-mastoid, the splenei muscles, those finding attachment to the hyoid bone, of the larynx, and, lastly, of the extremities, this variety of tic presents also special speech symptoms.

The following comprises a brief clinical picture condensed from Oppenheim's description:

The first symptom usually noticed is twitching of the facial muscles, especially a blinking of the eyes, a drawing of the mouth to one side, opening and closing it quickly, etc. Frequently such acts are accompanied by contractions of the neck muscles. In the course of the disease, perhaps after the lapse of considerable time, movements apparently purposive may be noticed, seemingly the result of an effect or bearing the impress of habit; or the subject may seem to be carrying out a reflex movement, as, for instance, he rubs his nose, grasps his chin, loosens his collar, etc., and these movements are repeated in a stereotyped way. The patient is again and again compelled to go through the same performances, so that the original, in all probability purposive, act becomes pathological. Nearly always co-ordinate tic exists—that is, habitual movement combinations—or such as are the result of an irresistible impulse. In nearly all cases also the respiratory organs and structures engaged in voice production are implicated. This may consist of mere sighing, sniffing, sobbing, barking, etc.; may take the form of repeating words which may be senseless, but phonetically allied (verbigeration): of calling out profane or obscene words (coprolalia); of repeating one or more times the last word of a sentence they have just heard (echolalia); of mimicking a movement they see (echokenesis); or of giving verbal expression to a thought uppermost in the mind (tic de pensée). Imperative conceptions, such as counting up to a certain number (arithmo-

mania); of having to refrain from touching certain things (delire du toucher); or to abstain from naming certain objects, therefore, perhaps, spelling them (onomatomania), etc., also exist.[1]

As regards a differential diagnosis from affections that present movements nearest alike, Sachs remarks that muscular action in the disease of convulsive tic is much more systematic and more intermittent than in chorea minor; that the difficulties of speech in the latter affection are the very reverse of the explosive utterance previously mentioned; and that, moreover, echolalia and coprolalia never occur. The same author believes that Gilles de la Tourette's disease may bear a superficial resemblance to hysteria, but that hysterical stigmata are generally wanting, and that the latter affection presents no such constant repetition of more or less convulsive movements. The last statement, strictly speaking, is not true unless the epileptoid symptoms of grand hysteria be excluded, but movements in the latter case do not resemble those of tic, because occurring while consciousness is more or less disturbed, and also because the separate acts of co-ordination are more deliberate, while the character of the act is so far removed from what is ordinary that it does not appear purposive.

As to hysterical stigmata, their not infrequent presence in neurotic children at about the age of puberty leads me to doubt that they are generally absent, and I therefore deem it best here, as always, to depend upon the general impression received, in deciding whether the patient's movements were due to chorea major or would need to be classified under the habit spasms. It must be recognized, however, that an entirely satisfactory differential diagnosis is frequently an impossibility in practice, for the reason that upon a substratum of hereditary tendencies there is sometimes superimposed a suffused symptom-complex due to several existent neuroses. Owing to this fact, the effect of one may seem a part or result of another affection whose symptoms at the time of examination are more prominent. This may become important in considering the prognosis.

The mental element in Gilles de la Tourette's disease is well established, and, as in many forms of psychic derangement, its chief manifestation has to do with an exaggerated yet defective faculty of association. Witness the perception of a subject in certain somnambulistic states, who will mistake words spoken to him for others sounding somewhat alike, and will repeat the error again and again, while an existing normal or hyperacute sense of hearing enables us to exclude a peripheral defect of transmission.

[1] There is a disease seen in adults which is apparently identical in origin. It occurs in persons described by Beard as "jumpers," and is also known as latah in Southern Asia, and as miryachit in Eastern Siberia. In this form echokenesis with coprolalia appears to be especially characteristic.

A patient with katatonia and the child with the disease of convulsive tic alike possess the habit of repeating long lists of words, perhaps of no meaning, but certain to bear a phonetic relation to each other. Both apparently derive the same satisfaction therefrom. We find examples of associative ideation in the delusion systems of paranoia, which are forever being elaborated and added to by new combinations or newly assumed facts bearing a plausible relation to the chain of delusions previously entertained, while we may state upon the authority of Kraepelin, that the patient in the maniacal state of periodic or circular insanity, who occasionally betrays keen insight as to his immediate society or into passing events by appropriate, trenchant remarks, does so by comparisons which, if carefully analyzed, will be found largely based upon an exaggerated perception, also upon the ability to form combinations which are dependent upon the power of imagination rather than upon conclusions which have been logically deduced. In a measure, the same is true of persons mentally healthy if the imagination present the dominating faculty. Cerebration in all these cases, therefore, whether perceptive or ideational, is strong in association. There exist great powers of receptivity and of associative ideation, unequalled, however, by higher inhibitive judgment. Impulse due to sensory perception is habitually transmitted to motile centres after having been weighed but cursorily in the balance of reason. Hence, where inhibitive judgment is for a time suspended the individual may become imitative in that he responds faithfully to impressions received from without, as does the string of an instrument that vibrates audibly to extraneous sound of the same pitch. At other times such a person becomes subjectively automatic, for reasons to be presently noted.

Conscious, involuntary, purposeless movements may arise from direct irritation of motor neurons exerted centrally or reflexly through the medium of a peripheral sensory impulse. That is another form of movement, without volition, however, in which we must assume *that an impulse originating in sense-perception is associated with perception memories, carried thence to mechanisms storing associated memories of volition, and terminating in action represented by the latter, the inhibitative function of the will* (*that selective quality of the mind evolved by co-ordination and synthesis of thought memories*) *being held meantime in abeyance.*

In this way we may explain an apparently purposive act performed involuntarily and, moreover, reflexly.

In a patient with the disease of convulsive tic we have to do with a brain powerful in association of impressions, and one which, weak in inhibition, has acquired the habit of permitting conscious, involuntary, purposive movements.

Some American authors, among them Osler and H. C. Wood, speak

of the psychic state in the affection we are considering as characterized by the existence of fixed ideas. I believe that "fixed ideas" is a bad term to employ in this connection, because the same has long been used to designate uncorrected—*i. e.*, insane delusions.

"Imperative conceptions" (corresponding to the Zwangsvorstellungen of the Germans) has been suggested, and is better because possessing a more specific meaning. Gould defines imperative conceptions as "false ideas that an insane person dwells upon, and which he cannot expel from his mind, even when he knows them to be absurd, and which dominate his actions." Admitting that the existence of imperative conceptions evidences a mentality departing in something from an ideal psychic prototype, we must nevertheless all agree, I believe, that they do not prove insanity. In reference to this form of dominant idea, Osler, in his monograph *On Chorea*, quotes the proclivity of Dr. Samuel Johnson for touching posts. This act was so necessary to the doctor's well-being that he frequently turned back if, for some reason, he had neglected to touch some of the posts in passing, a characteristic example of an imperative conception in a man who, we must acknowledge, was sane, and who was not otherwise regarded by his contemporaries. In fact, imperative conceptions are widely prevalent in our day; they are common enough among the much-worried and overworked business man, and, with some observation, will be found not unknown among physicians. So far as I know, where writers have attempted any explanation of their existence, they have been regarded as central in origin. Oppenheim defines them as "ideas not evolved by association, but which arise spontaneously and violently force themselves into consciousness." Central they must be—in all probability, the effect of irritation of memory centres—but that their origin be unassociative one must doubt, as likely involving an impossibility, since the products of psychic, like those of physical energy, must ever depend upon what has previously existed. Aside from obvious refutation of his own definition, which the author last cited gives within a paragraph by quoting the desire which arises in some people to plunge themselves from a height, or to wound themselves when looking at sharp instruments, we know that education of the babe is entirely founded upon sensory perception of its environment; later, upon associated memories of these impressions, from which judgment is at last evolved. Indeed, can we imagine the occurrence of subjective cerebration unassociated with previous experience? I believe not.

It will not be out of place also at this time to record several characteristics of imperative conceptions which show their close relationship to the imagination and the emotions rather than to the more deliberate faculty of reason. Their possessor is usually not only conscious of an impression foreign to his normal mental habit, but he frequently enter-

tains the idea with unwillingness and even with repugnance. In close association with this effect are fear and pleasure. The subject may experience all three emotions in reference to a single act, the combination of any two, or perhaps but one. Repugnance is felt because of the unwillingness to give way to an impression which he knows to be absurd; fear, because of possible evil which may obtain if he fail in the precaution prompted by his impulse, while pleasure appears as an inward satisfaction which the person feels is in no way compatible with his senseless movements. In those cases in which there is fear of the consequences of the act, and pleasure despite the knowledge of doing wrong, sexual excitement may be regarded as the underlying factor; on this account, and because one must assume more or less loss of consciousness on the part of the subject at the time of carrying out his impulse, this class is to be differentiated from the more innocent imperative conceptions and their effects. This phenomenon deserves discussion in reference to a number of varieties of insanity and degenerative states; but I shall consider it only in reference to the disease which is the subject of this paper.

Let us picture to ourselves a man seated in a room, who, determining to leave and to lock it, proceeds to carry his ideas into immediate effect. Having passed out he turns the key, and at the same time is chiefly conscious of this act. There are, however, any number of subconscious ideas which, as the result of experience, are stored up as memories and stand in close relation. Some of these would naturally refer to the security of locking one's door, to the fact that a door may not be locked, although the key seems to have been turned properly, or that such a room may easily be entered by thieves, etc. All such associated ideas lie dormant, as it were, in the normal mind unless something occurs to bring one or more into active consciousness—as, for instance, if the key seems to slip in turning, or the door upon being tried appears to give, the matter of making certain the same was fast would be gone over again, upon which it would be dismissed from the mind. Not so, however, in a person possessing an imperative conception in reference to the act narrated. The idea that, after all, the door may not be locked cannot be banished. This notion may have originated in fact, but the mere possibility of its occurrence, in some way brought to the mind, would suffice. If he knows his failing, such a person is likely to be unusually careful in his actions. In this case, as an additional precaution, he may wait a moment before withdrawing the key from the lock—perhaps may measure his time by counting up to a certain number. This is done to be able later on to range against the imperative conception something more than the mere memory of essential movements. All to no purpose; the feeling of doubt dominates every other consideration, and, by the aid of imagination's fears, all but permeates

the mind, thus crowding out the reasonable facts. If, by exercise of extraordinary force of will, he conquers his impulse, this person will continue his way, but in an uncomfortable frame of mind; if, however, the imperative conception prevails and he returns once more to try the door, he is at once conscious of a certain satisfaction and of the fact that he has committed an absurdity. In reference to such cerebration, I believe we may assume *that the centres of judgment have either inhibitively overcome or have given way to a reflex, effected by sense-perception and passing from memory of perception to memory mechanism, recording an act (to have tried the door, thus proving it locked), and thence to the corresponding motor centre.* It will also be noted in the case in point that the resulting acts were approximately voluntary. A patient with Gilles de la Tourette's disease presenting the symptom of arithmomania in the beginning counts voluntarily also; but as time goes by the original significance of doing so in reference to certain acts is lost, since the patient has now acquired the habit of counting in reference to almost any movement, or the counting may have originated entirely in the idea of warding off evil things after the manner of a charm, a notion which the child-mind has abundant opportunity to acquire and grasps with avidity. Having begun by counting voluntarily as an impulse prompted by an imperative conception, the patient soon does so by associative automatism. Arithmomania, therefore, may serve as a type of symptom which offers a connecting link, as it were, between conscious voluntary and conscious involuntary associative movements, such as a mimic spasm, echolalia, coprolalia, and tic de pensée always represent. I look upon both varieties of movement, however, as completed central reflexes. That such reflex action should at one time result in movement approximating volition and at another in an involuntary act, depends upon frequency of performance, and hence, in the latter case, to the tendency to automatism which exists normally. The voluntary act of locking a door is a common one indeed, yet, compared to the frequency with which we transform a thought into words, becomes one of comparative rarity. We give, for instance, that person considerable credit who, while performing an act requiring appreciable mental supervision, can at the same time speak in reference to a different line of thought. I call to mind a professor who delighted in the fad of lecturing to his students while reading a manuscript which he would subsequently prove he had digested. On the other hand, since it is a faculty common to all, we do not regard it as extraordinary that one may converse or think with concentration while walking, turning into proper streets upon our way, avoiding the dangers of crowded thoroughfares, etc.

A word in reference to that most characteristic symptom coprolalia. This peculiar bent may arise from the better opportunity of older chil-

dren to observe the habit of profane language in others; but even where the child be of tender years the opportunity of hearing profane language will some time occur, and its impression, perhaps, rendered more indelible as soon as it learns these words belong to things forbidden. Aside from these possible sources, however, children approaching the age of puberty, or, if younger (as is not infrequent in neuropathic types), who are sexually precocious, the use of profane or obscene language as an effect of sexual excitement is to be considered. At least two German alienists have within recent years demonstrated the close connection between perverse sexuality and the desire on the part of the subject to injure or to humiliate either the object of his passion or himself. That the method of humiliation may take the form of abuse by violent and unseemly language is equally certain. Moreover, Kraepelin says that a sort of physiological sexual perversity may exist at about the age of puberty, finding expression in most peculiar ways, and which, I believe, without doubt may be referred to the newly-developing, obscure physical impulses which are as yet uncomprehended and uncontrolled. Pertinent in connection is Gowers' observation concerning habit spasm, that in boys the affection often is due to masturbation, and that from this cause severe cases are sometimes met with.

Before concluding with symptoms, it is well to call to mind that the pathological symptom-complex which we are discussing, in common with many affections of the nervous system, has prototyes which, although clearly indicating unstable nervous action, must nevertheless be regarded as within physiological limits, the pathological forms being merely distinguished by intensity of manifestation. Thus the habit of some to frequently express opinions without a moment's thought, sometimes so quickly that such persons are themselves scarcely aware, and which they regret the next moment, may be cited as exemplifying physiological tic de pensée. Again, instances in which persons to be regarded as normal acquire one or a few associative acts are so numerous as to make it unnecessary to submit examples.

Mention must also be made that in all probability all the muscle contractions in Gilles de la Tourette's disease must not be considered as reflexes emanating from memory centres, although I believe those which are characteristic are. In addition to the latter, however, there are muscular twitchings that do not differ from those common to many nervous states, and which may be regarded as inanition twitchings due to abnormally sensitive or irritated muscle centres, so quickly do they yield to rest and a better metabolism.

Prognosis. Being a functional disease, prognosis as to life scarcely enters into consideration; but as chorea minor sometimes precedes or follows, or may occur concomitantly, one needs to be on the lookout for heart lesions, in order to avoid seeming error or an unpleasant surprise. The same applies to serious results due to an accompanying

epilepsy. As regards recovery, Osler, in his work on *Practice*, quoting Guignon, gives the prognosis as bad; but in his monograph *On Chorea and Choreiform Affections*, the same author regards the prognosis as uncertain, and reports a case which ended in complete recovery. Oppenheim records the fact that some authors regard Gilles de la Tourette's disease as incurable, but states that this is incorrect, and also reports entire recovery in several cases; in one, a case of four or five years' standing. This took place with the beginning of the menses. This author believes, however, that an entirely favorable termination occurs only in a small minority of cases. Gowers' more favorable observation in relation to habit spasm, that habit movements usually cease after a time, but sometimes persist, is obviously not entirely applicable to the special form being considered. A number of other authors content themselves by stating that the disease is chronic, lasts for years, etc. We may say that the number of complete recoveries will be small, but that in a considerable number of cases which are taken in hand early, well-directed treatment will result in so great an amelioration of distressing symptoms as once more to make these patients socially fit under ordinary circumstances. Under stress of emotion we may expect lapses to occur. Analogous to a frequent termination in Graves' disease we obtain "recovery with defect."

TREATMENT. The fact that this will be based upon methods employed in a number of so-called functional diseases merely emphasizes the need for intelligent supervision. The first indication comprises the patient's removal to surroundings which will supply quiet, good hygiene, and discipline administered in kindness. This step loses its empiricism and becomes rational if we may assume that in his new home the patient's mind, to a great extent, begins to store up memories unassociated with the development of his perverted habit, while perhaps of even greater importance is the stimulus of inhibitive, conscious attention which lies in environment both novel and pleasing. It is as well to enlist voluntary effort to inhibit movements. The patient's interest in this respect may sometimes better be engaged by a system of rewards. On the other hand, punishments or threats of it inspire disquieting emotion, and are therefore injurious.

Having in all probability to do with toxic substances which act as irritants to nerve structure, we strive for their constant elimination. As regards the alimentary tract, it is well to begin with small doses of calomel, perhaps combined with ipecac, the same to be followed up, after free catharsis has been established, by salines in just sufficient doses to keep the bowels open and the appetite active. If, owing to forced feeding or other cause, the bowels become sluggish the sequence is to be repeated. The presence of the uric acid diathesis should be combated by reduction in the allowance of meats, especially salt meats, and of other nitrogenous substances and of the carbohydrates. Vegetables,

particularly such as are rich in alkaline salts, and also acid fruits, are permissible. In all cases, however, aside from generalities, individual idiosyncrasies should be noted and the character of the diet arranged in accordance therewith. As regards internal medication, arsenic holds first place as to frequency of administration, and is lauded by Gowers and Weir Mitchell for the treatmentof habit spasm. Although Oppenheim considers it valueless in Gilles de a Tourette's disease, I believe I have seen good results follow its use. The author last quoted has as little faith in hyoscine and eserine, although after using the latter he was able to record cessation of movements for several days in one case, but only after intoxication had taken place. One will be compelled to give bromides at times, but their constant use cannot be recommended. When the digestive tract is in good condition and the diet full but judicious, the ordinary tonic mixtures, sometimes largely prescribed, may be dispensed with. In many cases their employment had better be altogether eliminated, as the customary alcoholic menstruum is badly borne, as a rule. Even in small quantities it may derange digestion and affect mental control. Warm baths and galvanic electricity may be administered for their quieting effect. The skin should be kept active by means of the former; cold sponges may be given where well borne. Some plan of forced nutrition based upon the Weir Mitchell treatment is always indicated, but demands particular vigilance to note that digestion keeps pace with the increased quantities of food consumed. Success in effecting an increase in body-weight will be accompanied by a cessation of the inanition twitchings previously mentioned.

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ANEURISM OF THE CORONARY ARTERY; A REPORT OF TWO CASES.

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THE specimens here described were both kindly given to the writer by Dr. Ludvig Hektoen, and are reported somewhat in detail on account of the great rarity of the conditions.

CASE I.—The subject, a man aged about forty years, was found dead in the street, the autopsy being performed by Dr. L. J. Mitchell. Unfortunately, the body was never identified and nothing could be learned concerning his history.

At the post-mortem examination no evidence of violence was discovered. The brain, alimentary tract, liver, and spleen were normal in appearance. A few pleuritic adhesions bound down the lungs to the chest wall. The kidneys showed the effects of a slight chronic diffuse nephritis. The chief interest centred in the heart and adjoining vessels. The weight of the heart is 300 grms. Externally the specimen presents a rounded eminence, situated over the left auricle, behind and to the left of the root of the pulmonary artery. Upon laying open the cavities the mitral, tricuspid, and pulmonary valves are seen to be normal. The heart muscle is of a natural color. The semilunar valves are thin, translucent, not deformed, and close tightly. Near the base of the aorta and in the sinuses of Valsalva the intima is

FIG. 1.

dotted with a few whitish areas where a moderate degree of sclerosis and fatty degeneration has taken place. These changes, however, are not more marked than is usual at the age of forty-eight. Nowhere is there any deposit of lime salts. The opening of the left coronary

artery is enlarged and irregular. Section reveals just beyond the orifice a dilatation of the artery wall outward, forward, and downward, forming a tumor the size of a pigeon's egg. This sac is nearly filled with lamillated blood-clot, leaving a cavity about as large as a hazel-nut. Around the adherent clot the wall of the artery can be traced distinctly. The distal portion of the aneurism communicates with the artery beyond. The dilatation extends to the division of the vessel into its two branches. In the posterior or transverse branch the wall is sclerotic but calcified; the anterior or descending branch is also thickened and its lumen filled with a thrombus. Only slight atheromatous changes are present in the right coronary artery.

Microscopical Examination. Sections of the aneurism were cut parallel to the coronary artery and including its origin from the aorta. Immediately above the orifice the aortic wall is infiltrated, the invasion of round cells apparently starting at a break in the intima and encroaching upon the middle coat. Several small areas of necrotic tissue replace the middle and inner layers of the aorta at the point of junction with the coronary. The thrombus, on the whole, is homogeneous, but in some places is striated. Lining the inner surface of the sac is a thin, irregular layer of relatively recent blood-clot filled with round cells and beginning to organize. The arterial wall surrounding the aneurism is somewhat thickened, and in some places there are streaks or clusters of infiltrating round cells—evidence of inflammation. A cross section of the descending branch of the left coronary exhibits a sclerosis of the wall and a lumen filled with blood-clot, which is pale and stains homogeneously, but is not adherent, and, therefore, probably of post-mortem origin. Such a view is confirmed by the absence of interstitial changes in the heart muscle supplied by this vessel. An interesting condition is found in a section from one of the columnæ carnæ in the left ventricle. In regions the cement spaces uniting the ends of the muscular fibres are much widened, and more rarely a fibre is itself ruptured, leaving the broken ends rough and lying in a changed direction. This separation and rupture of fibres, known respectively as segmentation and fragmentation, was first observed by Renaut[1] in 1877. By many subsequent investigators, and particularly by Hektoen,[2] in an exhaustive study, segmentation has been found quite constantly in cases of sudden death. The latter author recorded its presence in every one of ten cases of instantaneous death due to traumatism.

CASE II.—*Clinical History.* J. H. W., a man, aged thirty-nine years, and native born, was admitted to the Cook County Hospital, October 27, 1898. A telegraph operator by occupation, he had for a year previous been employed as an advertising agent. Both maternal grandfather and grandmother died of apoplexy; mother of heart disease. He always smoked and chewed tobacco, and used alcohol to excess. Several years ago he contracted syphilis, and one year ago had a paralytic stroke. His last illness began four weeks before entrance to the hospital, when he noticed numbness and tingling in the legs and feet, and later over the whole body. During this time he had several convulsions. At the time of admission he was having general convulsions of about one minute's duration, at intervals of five minutes.

Physical Examination. Nutrition good. The pupils were equal and reacted. The tongue protruded to the left and was tremulous. There was paralysis of the left facial muscles. Two scars of recent origin were

noted above the left eye; also an old depression. Right radial pulse full and strong, left weaker. Heart sounds loud and irregular. Lungs normal. Left arm and leg partially paralyzed. Temperature, 99.4°; pulse, 124. Urine acid, 1032, faint trace of albumin, granular casts.

The convulsions recurred several times a day, always accompanied by unconsciousness. Subsequently he developed a bronchopneumonia, from the immediate effects of which he died, November 5, 1898.

Post-mortem Examination. Body of a rather slender, well-nourished and developed man. Rigor mortis marked; lividity posteriorly. Mucous membranes of the upper respiratory passages showed no lesion.

The skull and scalp exhibited no changes externally. Internally the right parietal bone showed some fine erosions, corresponding to a circular area of adhesions between the pia and the dura mater. In the adhesions was a grayish-yellow layer of granulation tissue of rather soft consistency, flattened and circular in outline. Around this district the cortex was somewhat softened, but the remainder of the brain, as well as the pons, medulla, and cerebellum, was normal. The vessels at the base of the brain showed nodular and irregular yellowish thickenings.

The abdominal, pleural, and pericardial cavities were empty, their lining membranes smooth.

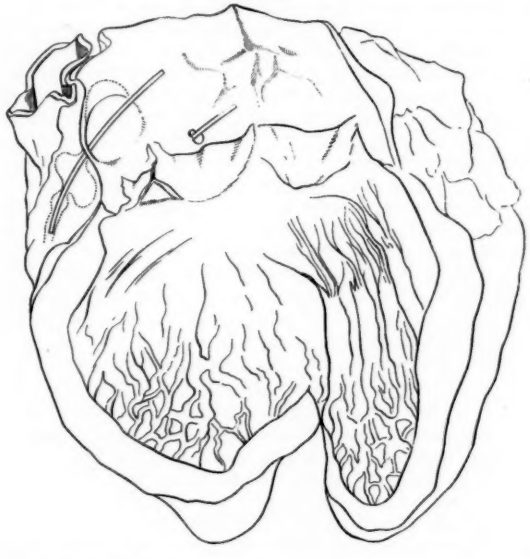
The spleen presented no abnormal appearance. The liver weighed 1400 grms., and cut with normal resistance; it showed some congestion of the centres of the lobules. The pancreas and intestines appeared normal. The kidneys weighed 300 grms. The capsules were adherent in places, and the fœtal lobulations were still present. The cortices were rather wider than normal, the markings distinct, the arteries prominent. The testicles were normal.

Over the upper lobe of the right lung were a few firm adhesions. The lungs crepitated, excepting the left lower lobe, which weighed 450 grms., sank in water, and was bluish in color. On the cut surface were numerous grayish-red granular areas, varying in size from that of a split pea to 1 or 2 cm. in diameter. The lung tissue between these areas was collapsed and deep red or bluish-red in color. The remaining parts of the lungs were considerably congested, and the larger bronchi contained mucopus. The peribronchial glands were normal.

The *heart* weighs 550 grms. There is marked thickening of the left ventricular wall. The tricuspid, pulmonary, and ventral valves appear normal. The endocardium is smooth, excepting that the free margin of the aortic valves is rough, thickened, and sclerosed. Just below the junction of the left and anterior semilunar valves is a small bulging in the septum, which admits the tip of the index finger, and is lined with a dense fibrous tissue. Anteriorly the aneurism and the sinus of Valsalva of the posterior pulmonary valve are separated by only a thin partition that is translucent. The "undefended space" situated to the right of this cavity is unaffected. Above the left semilunar valve is a bulging of the aortic wall upward and forward into the loose periaortic tissue, so that the artery is undermined. Bordering on this aneurism is the left coronary orifice, which is of normal size. Immediately beyond the opening, however, is a fusiform dilatation of the arterial wall, large enough to contain a hazel-nut, and extending for the most part posteriorly and to the right. Its walls are streaked with yellowish spots, and in places calcareous scales can be peeled off. Beyond this cavity is a second and smaller dilatation of the right wall.

The beginning of the aorta is very much thickened, the intima irregularly fissured, and similar changes exist throughout the entire thoracic aorta.

FIG. 2.



Microscopical Examination. In the sections the intima is seen to be overlaid by an old thrombus. The artery wall is thickened. Near the orifice the continuity of the intima is broken, and there has been an invasion of round cells. At this point, and in other places within the aneurism, the inner layer has been replaced by calcareous deposits. Some of these calcareous changes extend deep down into the middle coat of the artery.

The heart presents the picture of an extreme myocarditis. The bloodvessels are sclerosed and surrounded by dense fibrous tissue. Some of the muscle fibres are atrophied, some have disappeared, leaving large areas that are occupied by interstitial cells.

Here, also, as in the previous case, there is a segmentation and fragmentation of the muscle fibres.

I was surprised in reading the literature to learn that while aneurisms of the heart and of the root of the aorta are comparatively common, so very few instances of coronary aneurism have been described. The accompanying table comprises all the cases that I could find in which the aneurism unquestionably arose in the coronary arteries.

Both left and right coronaries seem to be involved about an equal number of times. The usual site of the dilatation is very near the origin from the aorta in the loose cellular tissue, so well described by

Vestberg[20] as the "periaortic space." This location is also a favorite place for interparietal aneurisms of the heart.

The affection vastly predominates in males.

Age has less influence in the etiology than one would suspect, considering its rôle as a predisposing cause in aneurism elsewhere. More cases were under forty than over that age. A remarkable fact is its occurrence in two very young children.

Occupation is not an important factor, only two subjects being engaged in heavy work. Two individuals gave a history of rheumatism and excessive drinking.

The diagnosis of the lesion was never made during life, since, unless rupture took place, it gave rise to no adventitious sounds, and its location over the auricle did not increase the area of cardiac dulness.

It is doubtful if uncomplicated, unruptured coronary aneurism has any characteristic symptoms. In two cases dyspnœa, cough, and transient pains over the heart were present, but could be better attributed to coexisting bronchitis and valvular insufficiency of the heart.

The disease usually terminates in death from rupture of the aneurism into the pericardium, eleven of the nineteen cases dying from this complication. In the others the aneurism was apparently benign, and was accidentally discovered at autopsy.

Authors.	Sex.	Age.	Occupation.	Cause of death.	Remarks.
Bougon . . .	M.	...	Soldier,	Rupture into pericardium.	Right coronary, one inch from origin.
Otto . . .	M.	40	.....	Rupture into pericardium.	
Merat . . .	M.	...	.....	Not stated.	Aneurism of small size.
Peste . . .	M.	77	Currier,	Rupture into pericardium.	Left cornary, near origin, small size.
St. Bartholomew's Hosp. Museum.	M.	11	.....	Not stated.	Several small pouches.
Stevenson . .	M.	...	Soldier,	Rupture into pericardium.	Right coronary, size of walnut, also aneurism of aorta.
Peacock. . .	M.	51	Butcher,	"Bronchitis"?	Left coronary, size of pigeon's egg.
Bristowe . .	M.	22	Sailor,	Paraplegia.	Both arteries, several small aneurisms; right coronary, size of walnut.
Ward . . .	M.	38	Laborer,	Rupture into pericardium.	Aortic aneurism.
Heuse . . .	M.	21	Waiter,	Rupture into pericardium.	Both arteries; multiple aneurisms.
Finnell . . .	F.	25	.....	Not discovered	Right coronary.
Markoe . . .	F.	30	.....	Rupture into pericardium.	Size of hazel-nut.
Clark . . .	M.	30	Waiter,	Rupture into pericardium.	Left coronary, near origin.
Ogle . . .	M.	26	Blacksmith,	Rupture into pericardium.	Both arteries, small size.
Buchner . .	...	...	.....	.....	Left coronary.
Crisp . . .	M.	63	Carpenter,	Rupture into pericardium.	Right coronary.
Malet . . .	M.	5	.....	Rupture into pericardium.	Left coronary.
Hektoen . .	M.	48	.....	Not known.	Left coronary, near origin, size of pigeon's egg.
Hektoen . .	M.	39	Telegraph operator,	Bronchopneumonia.	Left coronary, size of hazel-nut.

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A CRITICAL SUMMARY OF RECENT LITERATURE

CONCERNING

THE MOSQUITO AS AN AGENT IN THE TRANSMISSION OF MALARIA.

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PREVIOUS to the year 1898 little was known concerning the means of transmission of malaria from one individual to another. This subject had occupied the attention of many observers who had devoted much time to the study of the disease. Inoculation experiments had positively proved that malaria could be transmitted from one individual to another by the subcutaneous injection of blood containing living malarial parasites, but there was little evidence pointing to the ordinary modes of transmission of the disease that could be regarded as at all convincing. We were utterly ignorant of the form in which the malarial parasite existed outside the body, and equally in the dark as to the manner in which it entered. The theories advanced were purely hypothetical, and without experimental foundation on which to base them.

The results of experimental work published during the past year have done much toward dispelling the mist that has so long obscured this important problem. The work of Surgeon-Major Ronald Ross, of

the Indian Medical Service, concerning the cultivation of the *proteosoma labbé* (one of the malarial parasites of avian blood) in gray mosquitoes, afforded the first convincing evidence that the mosquito was probably one agent by means of which malaria could be conveyed from bird to bird, and possibly from man to man. The mosquito theory of the transmission of malaria is not a new one. It was first advanced many decades ago, but was first vigorously supported by Manson, from whom Ross received his inspiration to carry out the investigations which have yielded such brilliant results. As early as 1894, Manson[1] suggested that the mosquito might be the intermedatie host for the extra-corporeal form of the malarial parasite, just as it is the intermediate host of the filaria nocturna, and that the manner of propagation of the two diseases was analogous. After enumerating several features in which the filaria nocturna and the malarial parasite resemble each other, Manson, at that early date, expressed himself as follows: "The parallel is very complete; the conditions, the requirements, and the problem to be solved are apparently identical for both parasites. As the problem and conditions are the same for both organisms the solution of the problem may also be the same for both. If this be the case, the mosquito having been shown to be the agent by which the filaria is removed from the human bloodvessels, this, or a similar suctorial insect, must be the agent which removes from the human bloodvessels those forms of the malarial organism which are destined to continue the existence of this organism outside the body. It must, therefore, be in this or in a similar suctorial insect or insects that the first stages of the extra-corporeal life of the malarial organism are passed." He believed that the flagellated body was the first extra-corporeal stage of the malarial parasite. He suggested that the flagella, on breaking away from the residual body or pigment-containing sphere, then, by virtue of their vibratory movement, penetrate the cells of some organ of the insect.

In 1896, Manson, in his Goulstonian lectures,[2] laid especial emphasis on the part which he believed the flagellate organisms played in the propagation of the parasite outside the body. He held that the crescentic body of æstivo-autumnal malaria and the tertian and quartan spherical bodies which proceed to flagellation were the "extra-corporeal sporulating homologues of the intra-corporeal spore; that the flagellum is the extra-corporeal homologue of the intra-corporeal spore." Both types of sporulating plasmodium were believed to have corresponding functions, both arising from the same source; one is the germ of the plasmodium inside the human body; the other is the germ of the plasmodium outside the human body; both function in the propagation of the parasite.

Laveran and Manneberg had also regarded the mosquito theory with favor, but had not associated the flagellum with the question of the

transmission of infections. Calandrucio had failed to observe developmental changes in the malarial parasites ingested by mosquitoes. Such changes were first observed by Ross, who, in 1895 and 1896, studied the behavior of the parasites in the blood within the stomach of mosquitoes fed upon injected human beings. He fed mosquitoes on patients suffering from æstivo-autumnal malaria, whose blood contained large numbers of crescents, and instead of finding no transformation, observed that from 40 to 50 per cent. of the crescents proceeded to flagellation and liberation of flagella. Beyond this, however, he was unable at this time to trace the development of the parasite within the body of the mosquito any further.

Having attributed such an important function to the flagellum, it may be worth while to consider whether Manson's inferences were justifiable, or whether the flagellum was destined to perform some other duty. In 1895, Sakharov[3] advanced an interesting hypothesis, which was not confirmed until some time later. He believed that he had demonstrated chromatin in the flagella, and that the latter represented the chromatic filaments of the nucleus of the parasite. He held that the process of flagellation represented a modification of karyokinesis, the chromatin filaments breaking loose from the body and appearing as the mobile flagella. This observation has been recently confirmed by Bignami and Bastianelli,[4] who demonstrated conclusively by Romanowsky's stain that certain of the flagella contain chromatin filaments. The demonstration of chromatin in the flagella suggests their similarity in structure and activity to a spermatozoon, and would seem to indicate that they served some purpose in the propagation of the parasite.

The important observations of MacCallum[5] on the *halteridium labbé*, a malarial parasite of birds, showed conclusively what the function of the flagellum actually is. He demonstrated without a doubt that the flagella represent sexual elements. Two forms of the halteridium were observed—one with hyaline and the other with granular protoplasm. Both these forms were seen to eventually leave the red blood-corpuscle. The hyaline form underwent flagellation, whereas this process was never observed to take place in the granular form. Certain of the flagella that tore themselves free from the hyaline forms were seen to rapidly approach and penetrate the parasites with granular protoplasm, and become completely lost in the substance of the latter. From this fertilized parasite an actively motile, conical-shaped organism, identical with the pseudo-vermicule of Danilewsky, was seen to arise. This pseudo-vermicule was very destructive, piercing masses of red blood-corpuscles, thus permitting the hæmoglobin to escape into the plasma and setting the nuclei of the red blood-cells free. MacCallum expresses himself concerning this body as follows: "The result of this fertilization is a motile stage which seems more resistant, and it is thought

possible, in view of certain facts, that this form may make its way through the intestinal canal to the external world." Subsequent to this observation MacCallum saw the same fertilization process take place in the blood of a woman suffering from æstivo-autumnal malaria.

As already stated, Ross, up to 1896, had not traced the malarial parasite beyond the flagellate stage in the stomach cavity of the mosquito. With the conviction that the mosquito theory was a promising one, he proceeded to pursue his investigations further. In August, 1897, he[6] found certain peculiar oval pigmented cells in the tissues of the stomach-wall of two dapple-winged mosquitoes fed on the blood of patients suffering from æstivo-autumnal malaria. The pigment was practically identical with that in the malarial parasite, and these bodies were found only in mosquitoes which had fed on the blood of malarial patients. On another occasion similar bodies were found in the stomach-wall of a gray mosquito which had been fed on the blood of a patient with tertian fever.

Thinking that some light might be thrown on the mosquito theory by the study of the blood of birds, Ross,[7] working in Calcutta, proceeded to devote his time to the study of the malarial organisms of birds' blood, and to endeavor to follow their development after being ingested by mosquitoes. He identified the same varieties of parasites as had been previously described by Labbé, Opie, and MacCallum. For his experimental work he used birds infected with proteosoma. After a certain variety of mosquito, which he termed the gray mosquito, had fed on the blood of birds containing mature proteosoma, Ross found that the stomach-wall of the insect always contained on the second day afterward peculiar pigmented bodies embedded in its substance. These resembled coccidia in their structure. The youngest coccidia seen on the second day were small oval bodies 8μ or less in the long diameter; they consisted of a colorable ectoplasm and an indifferent entoplasm, and contained pigment like that of the proteosoma, as well as vacuoles and granules. They grew rapidly and added about 10μ of diameter for every twenty-four hours of their life. A capsule developed, and the pigment, which generally surrounded one or more large vacuoles, gradually diminished in amount until, on about the fourth day, it vanished entirely. From this time the contents of the body became studded with numerous small particles resembling oil globules, and the whole cell began to protrude from the external wall of the stomach into the cœlom or body-cavity of the mosquito. The coccidia continued to grow until, on the sixth or seventh day, the size reached 60 by 70μ. No further development was observed from the seventh to the twelfth day after feeding. Ross noted a peculiar striated appearance within some of the older of the coccidia, while in others there were ten or twelve sausage-shaped structures to be seen. The

problem as to how the parasites were enabled to enter the stomach-wall remained to be solved. This must take place within the first twenty-four hours. The observation of MacCallum on the blood of birds infected with the halteridium seemed to afford the necessary explanation. What seemed more natural than that the actively motile pseudo-vermicule, resulting from the fertilization process, should represent the form of the parasite which enables it to embed itself in the stomach-wall of the mosquito. Ross found pseudo-vermicules in the stomach of a gray mosquito killed within an hour after it had fed on a crow with halteridium. Unfortunately for the theory, he failed to observe pseudo-vermicules in the stomachs of mosquitoes fed on birds infected with proteosoma, although, from inference, the same would be expected to occur. In referring to the relation between the proteosoma and the coccidia, Ross says: "Whatever that solution may be, however, there can be no doubt . . . that the coccidia constitute the mosquito-stage in the life history of the proteosoma."

Ross, with commendable enthusiasm, continued his investigations, and added new links in the chain of evidence supporting the mosquito theory. He published his observations in a preliminary report,[8] and they were also presented before the British Medical Association by Manson.[9] Ross observed that there were two forms of coccidia; one contained innumerable thread-like bodies from 12 to 16μ in length and 1μ in breadth, closely packed within the capsule of the mother coccidium; the other contained large black spores, which, when mature, were from 16 to 20μ in length and 2 or 3μ in thickness. On the eighth or ninth day the coccidia rupture and set these "reproductive elements" free in the general body-cavity of the mosquito, which contains the so-called blood or circulating juices. The reproductive elements are swept away by the blood-current and distributed throughout the tissue of the mosquito, as was readily demonstrated by microscopic examination. He found large numbers of the thread-like elements in certain gland cells situated in the anterior part of the thorax. On closer examination these cells were seen to form part of a gland which had hitherto been overlooked by biologists. In Ross' words: "This organ lies in the neck or the anterior part of the thorax of the mosquito, and consists of a number of separate lobes. Each lobe is made up of numerous large cells clustered around a central duct and contained within a limiting membrane. The ducts of the several lobes ultimately unite and form a single main effluent. This runs up the under surface of the head in the middle line, enters the base of one of the stylets or lancets of the proboscis—namely, the central unpaired one, called the tongue or epipharynx—traverses the whole length of it, and opens at its extremity in such a manner that the secretion of the gland must be poured into the very bottom of the wound made by the piercing apparatus of the proboscis.

"It is in the cells of this gland that the thread-like reproductive elements of the proteosoma-coccidia have the power of accumulating. How they manage to enter the cells from the blood I do not know; but it is certain that they can be found in them in large numbers, either floating separately in the grape-like cavity of the cells, or crowded together within them in hundreds. It is impossible to mistake their identity."

Ross believed that this gland represented a veneno-salivary gland, and strongly suspected that the thread-like bodies or "germinal spores" were injected with the secretion of the gland into the bitten bird of amenable species, where they were capable of developing into mature proteosoma, thus completing the cycle of the parasite. This suspicion he proceeded to prove by experiment. He obtained mosquitoes that had fed on proteosoma-infected sparrows, and preserved them for five or six days, until he knew that the germinal rods had formed and were contained in the cells of the veneno-salivary gland. He then allowed the mosquitoes to bite sparrows in whose blood careful microscopic examination had shown there were no proteosoma. He was rewarded later by finding immense numbers of proteosoma in the blood-corpuscles of these bitten birds. Out of twenty-eight originally healthy sparrows subjected to the bite of gray mosquitoes previously fed on diseased sparrows, twenty-two, or 79 per cent., became infected, all with a large number of parasites, in from five to eight days. Of two crows and four weaver birds subjected to the bites of the mosquitoes fed on proteosoma-infected birds, one crow and all the weaver birds developed proteosoma infections within nine or ten days.

Ross was unable to demonstrate what the function of the "black spores" is. His observations seemed to prove without a doubt that in birds infected with a parasite closely resembling the parasite in human malaria the mosquito acts the part of an intermediate host, and also possesses the power of conveying the infection by means of its bite It seemed natural to infer that a similar condition existed in connection with the malarial parasite of human beings, although this still lacked definite proof.

Daniels,[10] working in Calcutta under Ross' supervision, was able to confirm all of the latter's observations. He traced the various stages of the development of the proteosoma in the tissues of the mosquito up to the appearance of the germinal threads in the cells of the salivary glands. He also proved that mosquitoes fed on birds infected with proteosoma were capable of transmitting malaria to birds previously shown to be free from infection. Thus twelve out of twenty-two birds (54 per cent.) became infected. This compares unfavorably with Ross' earlier results, as, in his published series, twenty-two out of twenty-eight (or 79 per cent.) were infected. Ross' experiments, however, were

carried out under more favorable conditions. They were undertaken in the summer months, when the parasite develops more rapidly in the mosquito, and at which season the mosquitoes bite more readily and are more easily kept alive. Daniels thinks that it is possible that in the cold season the birds have a greater power of resistance. This view was supported by the fact that the birds which became infected soon recovered from the attack.

Concerning Ross' germinal threads, Daniels says that "They are sickle-shaped bodies, 14 to 15μ in length. They stain with logwood or methyl-blue, but not strongly. On adding water or Farrant's solution they lose their shrivelled appearance and become rounded. Nearer one end than the other is an unstained portion (nucleus?). They show no signs of movement, but as they are invisible in water, and only become visible when shrivelled by the salt or stained, it may be doubted if they have been seen alive." Daniels found the "black spores" in most of the mosquitoes he dissected. These spores are very resistant. He had seen some which had been kept in water for months by Ross, and which had undergone no visible change. They were very resistant to liquor potassæ. After rupture of the coccidial cysts these black spores are to be found all over the body of the mosquito, but not included within cells. They apparently do not accumulate in any particular organ. According to Major Ross, the most plausible view as to the nature of these black spores is that they are "resting spores," and "that through them, by another cycle, the proteosoma can be propagated in conditions unfavorable for direct propagation by mosquito-insertion into a warm-blooded animal." If this be the case three courses suggest themselves to Daniels:

"(*a*) From the black spores may arise bodies capable of non-parasitic life (and possibly of reproduction), which at certain stages of their existence, and in certain conditions, on introduction into a warm-blooded host by inhalation, through drinking-water, or even by injection by a mosquito or other blood-sucker in transferring them from the medium in which they live, may resume parasitic habits.

"(*b*) That they may be ingested by mosquito larvæ, and in them undergo such development as will result in the formation of germinal threads in the adult mosquito, which, in turn, may be injected into the appropriate bird.

"(*c*) That they may, if swallowed or inhaled by an appropriate warm-blooded host, so develop as to reach the circulation and pass into the sporulating phase."

Koch, Rübner and others have pointed out the intimate geographical association between malaria and the mosquito. Where one is found the other usually also prevails. Koch is very favorably impressed with the importance of the mosquito as an agent in transmitting

malaria. He is devoting a great deal of time at present to the study of malaria. It is greatly to be regretted that he has not been more liberal in giving due credit to those who have recently made important observations on the development of the malarial organism. In a late article (*Deutsche medicinische Wochenschrift*, February 2, 1899, pp. 69–70) he refers to the fertilization process already observed by MacCallum, and gives the unsuspecting reader the impression that this was an original observation made by himself.

The Italian* observers were not inactive while Ross was making his important discoveries in India. Dionisi[11] carefully examined the proboscides of mosquitoes, but was unable to find any bodies resembling malarial parasites either in the proboscis or in the drop of saliva frequently present. He determined that mosquitoes do bite birds, and that malarial organisms soon become unrecognizable in the intestinal contents of mosquitoes fed on infected birds. He did not succeed in infecting birds with mosquitoes from malarial districts. He made the interesting observation that the hæmatozoon infections in pigeons occur just at the time of moulting, when they are most readily bitten by mosquitoes.

Grassi[12] made a careful study of the varieties of mosquitoes which prevail in malarious and non-malarious districts, and found that three varieties are constantly present in malarious regions and absent in healthy districts. The association of these three forms of mosquitoes with the existence of malarial infections was so striking and constant that Grassi asserts "That after all the facts which have been stated, all the objections which could be made to the mosquito theory fall, and we may, on the other hand, assert that it explains all the phenomena of malaria." . . .

One of the three varieties of mosquitoes, the *anopheles claviger*, is, it appears, definitely associated, both in the localities in which it occurs and the time at which it bites, with tertian malaria, whereas the other two varieties, the *culex penicillaris* and the *culex malariæ* (a new species so named by Grassi) occur apparently invariably in the localities and at the times of year in which the æstivo-autumnal fevers predominate. Thayer[13] quotes Grassi as follows: "In conclusion, I am of the opinion that the *culex penicillaris* and the *anopheles claviger*, at least the *culex penicillaris*, perhaps also the *culex malariæ*, behave in malaria as does the tick in Texas fever. One must bear in mind that very few paludal gnats and mosquitoes (*zanzere e zanzerone palustri*) can be infected with malarial parasites, and, in fact, the greater part of them bite domestic

* For many of the following points concerning the mosquito and its relation to malaria, I am indebted to Dr. Thayer's recent review of the Italian literature on the subject. Progressive Medicine, March, 1899, vol. i. I have also had valuable assistance from Dr. Thayer in abstracting the recent Italian articles.

animals (oxen, horses, hogs, pigeons, hens) and healthy men. It may be, therefore, that a single bite of a paludal mosquito or gnat (*zanzerone o di zanzere palustri*) may cause malarial infection, just as it may be that a myriad of bites may fail to cause it." These statements require modificaton, as will be seen from the subsequent observations of Grassi, Bignami, and Bastianelli.

Bignami,[14] independently of Grassi, had commenced a series of experiments to determine the possibity of infection of human individuals by the bites of mosquitoes collected from malarial districts. He exposed a patient to the bites of mosquitoes collected from Porto, a malarious district. The mosquitoes were too scanty, and the experiment was continued with two patients in a different manner. The larvæ were collected from the same place, and were allowed to mature in a room into which the patients were subsequently placed. The results were again negative. Benefiting by the experience of Grassi, of which he had in the meantime become acquainted, he secured adult mosquitoes from Maccarese, an intensely malarious district, letting them loose in a room, and allowing an individual to sleep in the same chamber, as a consequence of which he was frequently bitten. The patient was an individual who had never had malaria, and who had lived for six years in the Santo Spirito Hospital, where no case of malaria had ever been known to develop spontaneously. The patient slept in the room from September 26th until the last of October, although at intervals there were but few mosquitoes present. On October 31st he had a slight elevation of temperature; on November 1st a chill, and afterward a remittent fever up to the administration of quinine on November 3d. On the morning of November 3d characteristic æstivo-autumnal parasites were found in the blood. Bignami believed that infection from other sources than from mosquitoes could be absolutely ruled out.

Specimens of mosquitoes from each batch were sent to Grassi for identification. Those mosquitoes hatched from larvæ were in all instances identified as the *culex pipiens*.

From every batch of mosquitoes used in the last experiment (which gave positive results) specimens were sent to Grassi, and among these he found the *culex penicillaris*, the *culex malariæ*, and the *anopheles claviger*—the latter few in number and only in one batch. That is to say, the mosquitoes to which the positive infection appeared to have been due were exactly those varieties which Grassi had found to be associated with æstivo-autumnal malaria.

Bignami proceeds to discuss the question as to whether malaria is contracted by inoculation alone. He believes that inoculation was, up to that date, the only means for which experimental demonstration had been obtained. He says: "I believe it may be safely affirmed that all the facts known up to the present regarding the biology

of the parasites allied to those of the malaria, favor the idea that infection is conveyed in only one way and introduced by only one method. . . . To sum up, malaria is a disease which is contracted by inoculation, a fact of which we have now obtained the first experimental proof, since we have seen that an individual who has never had malarial fever, by sleeping in a healthy place where no one had ever previously taken fever, may sicken of malaria of a grave type if bitten by certain species of mosquito brought in the adult state from some distant locality of highly malarious character. Further, everything points to the conclusion that inoculation is the only mode by which infection is acquired, since air and water as carriers of infection may be excluded, and because arguments based on analogy all tend in the same direction. This much, at any rate, we can assert—namely, that inoculation is the only mechanism of infection which has been demonstrated experimentally."

Bastianelli, Bignami, and Grassi,[15] working together, have made some interesting observations upon the cultivation of malarial crescents of man in the *anopheles claviger*. They claim that they have positively followed certain phases of development of these bodies, in the wall of the middle intestine, of several specimens of *anopheles claviger* which had been fed on patients suffering from æstivo-autumnal malaria. The most striking specimens correspond with those described by Ross in his experiments with the proteosoma of birds, and seen on the second and third day. In a room in which there were four patients, all apparently suffering from æstivo-autumnal fever, they collected six specimens of *culex pipiens*, one *anopheles nigripes*, and four *anopheles claviger*. In two of the *anopheles claviger* they found stages of development corresponding to those of the fourth day found by Ross in mosquitoes fed upon proteosoma. They are of the opinion that these mosquitoes are similar to the dapple-winged mosquito of Ross, in which he found stages of development similar to those of the proteosoma of the third day.

They relate the interesting observation that in Lentini, in Sicily, during last October and November, malaria was still prevalent, and the *anopheles claviger* was abundant, while neither the *culex penicillaris* nor the *culex malariæ* were to be found.

They produced a double tertian malaria, as the result of the bite of the *anopheles claviger*, in a man who was certainly not suffering from malaria, and who lived in a non-malarious district.

A number of publications by these Italian observers now followed each other in rapid succession. Grassi, Bignami, and Bastianelli[16] proceeded to study more accurately the phases of development of human malarial parasites in the bodies of mosquitoes. After biting the infected individual the mosquitoes were kept in the thermostat at 30° C., which

temperature was found most favorable for the developmental changes of the parasite.

They first studied the development of the æstivo-autumnal organism in the *anopheles claviger* after the latter had fed on infected individuals. They found that cultivation of the parasite in the mosquito occurred only when the semilunar bodies were mature—that is, when they developed into round bodies and flagellate forms. Briefly stated, they traced out all the various stages of the parasite in the tissues of the mosquito which had been previously described by Ross for the proteosoma of birds. The developmental changes were practically identical even up to the finding of the thread-like bodies or "sporozoids" in the cells and ducts of the salivary gland. They noted that the sporozoids were non-motile when present in their capsules or in the cells of the salivary gland, but that they were motile when free in the cœlom of the mosquito.

In specimens of *anopheles claviger* fed on patients with tertian malarial parasites they distinguished pigmented bodies on the outer surface of the mosquito's stomach, and followed the stages of development up to the fifth day.

They observed some important changes in the hyaline cells of the salivary glands of mosquitoes which had fed on infected patients some considerable time previously. These changes were believed to be due to transformations of the thread-like filaments. Some of the cells were filled with round or semi-round bodies. In others these bodies occupied the centre of the cell only. In rarer instances they were found in the tubules. When the cells were ruptured, fusiform bodies, shorter than sporozoids, but thicker and furnished with a nucleus, were seen to escape. In one case they saw in the same cell amongst these short bodies a certain number of filaments or sporozoids, and in one instance these sporozoids were seen to grow shorter and to take on the form of the shorter bodies. Beside the cells containing these round bodies, there were others containing irregular masses of hyaline material. These were found in an *anopheles claviger* which had fed on an infected patient one month before. The longer they waited after the mosquito had bitten a malarial individual, fewer of the round bodies and more of the hyaline masses were found. These changes occur in the æstivo-autumnal infections when there are "gameti" forms (sexually mature forms) present.

They say that the passage of malaria from man to the *anopheles claviger*, and from the *anopheles claviger* to man, has been demonstrated without a doubt. They support the view that there is a hereditary transmission of malaria from the mosquito through its egg.

They conclude: 1. That the hæmosporidia of malaria run in man the well-known cycle of development characterized by the long duration of

the amœboid stage and the absence of the encapsulated phase; in this cycle they reproduce themselves an undetermined number of times, and also give rise to forms which remain sterile in man ("gameti" of Grassi and Dionisi). These latter reach the middle intestine (or stomach) of the *anopheles claviger* and develop into sporozoa, which in turn result in the formation of sporozoids. These sporozoids collect in the salivary gland, and reach man again during the act of biting.

2. The development of the hæmosporidia in the body of the mosquito has been demonstrated for the parasites of æstivo-autumnal and ordinary tetrian fever.

3. While the direct passage of hæmosporidia from man to the mosquito, and from the mosquito to man, has been demonstrated, it remains to be yet proven that the mosquito transmits malaria to its progeny, although this is quite probable.

They add that they have found in the well-developed eggs of the mosquitoes certain bodies which may be interpreted as the spores of the hæmosporidia.

Later,[17] these same observers demonstrated that the *anopheles pictus* (dappled-winged mosquito of Ross) was capable of transmitting æstivo-autumnal malaria to man.

In April of this year Bastianelli and Bignami[18] read a most important communication before the Royal Academy of Medicine in Rome on the development of the tertian malarial parasite in the *anopheles claviger*. They refer to the fact that it is much more difficult to cultivate the tertian than the æstivo-autumnal parasite in mosquitoes. This is due to the fact that there are fewer "gameti" in the circulating blood of patients with the former than with the latter infection. By "gameti" they mean those forms of the parasite which do not go on to sporulation in the human subject, and which are destined to continue the life-history of the malarial parasite outside the human body. They bring up an interesting idea. They made out that the crescents, which are the gameti forms for the æstivo-autumnal parasites, develop in the bone-marrow; only the mature forms are found in the circulating blood, whereas the various steps in the development of the crescents can be seen in the bone-marrow. The gameti forms of the æstivo-autumnal parasite are found in large numbers in the circulating blood. In tertian blood the gameti develop entirely in the bone-marrow, and only appear in small numbers in the circulating blood just before the chill. Hence the smaller liability of mosquitoes becoming infected by biting malarial patients suffering from tertian infections.

MacCallum had observed that there were two forms of round bodies in the halteridium, one of which represented the female the other the male organism. Bastianelli and Bignami have found that there are two forms of gameti for the tertian parasite as well, and have designated

them by names already in use by biologists. The male forms are called "microgametocytes" and the female forms "macrogameti." By proper staining methods they have been able to study the finer structure of these forms. The nucleus of the microgametocyte is centrally situated and the chromatin is abundant and present in the form of filaments. In the macrogameti the nucleus is larger and situated at the periphery; the chromatin is scarce and occurs in the form of granules. From the microgametocytes the flagella arise. They find that the filaments of chromatin of the nucleus pass out into the flagella, being ensheathed with a certain amount of protoplasmic substance. They designate the flagella by the term "microgameti." It is interesting, that as early as 1895, Sakharow[19] claimed that he had demonstrated that the flagella represent the chromatic filaments of the nucleus of the parasite. His view was generally discredited at the time. They find that four microgameti always develop from the crescents. In the tertian there are usually six or seven microgameti, six being the more common number.

The number of gameti bears a close relationship to the acuteness of the malarial attack. They are most numerous in the first attack and in the first relapse, and less numerous in subsequent relapses.

In studying the sexual behavior of the microgametocytes and the macrogameti, they found instances in which the nucleus of the latter contained a filament of chromatin, presumably due to fertilization of the macrogameti by the microgameti derived from the microgametocyte.

They enumerate various points in which the gameti of æstivo-autumnal differ from those of tertian malaria.

a. In the form of the sporozoon, which is usually fusiform or ovoid in æstivo-autumnal, while it is generally round, exceptionally ovoid, for tertian parasites.

b. In the aspect or appearance of the sporozoon. In the case of the æstivo-autumnal it has a more definite outline and greater refraction, and consequently is well seen even with low powers, whereas in the case of the tertian it is more transparent and less well seen.

c. In the quality of the pigment, which is not identical with that of the parasites of man.

d. In the volume and number of nuclei into which the sporozoon divides. In the tertian sporozoon the nuclei are larger and less numerous than in the æstivo-autumnal.

e. Certain differences also exist in the arrangement of the sporozoids in the capsules of the sporozoon. The sporozoids are more regularly arranged in the capsule of the tertian. They claim that the differences in the disposition of the sporozoids enables one to distinguish whether a mosquito is infected with a tertian or æstivo-autumnal parasite.

They carried out some practical experiments. In one case a man who had never had malaria, and who did not live in a malarious dis-

trict, developed double tertian fever from the bites of the *anopheles claviger*, examples of which on subsequent examination were shown to contain the encapsulated forms of the tertian type.

In a second case, a patient with æstivo-autumnal malaria was allowed to be bitten by mosquitoes (*anopheles claviger*), and seventeen days later he developed a tertian infection, the æstivo-autumnal dying out. Some of these mosquitoes which had infected the man with a tertian fever were examined, and it was found that encapsulated forms of the æstivo-autumnal type had developed in the stomach-wall. Others were allowed to bite a second patient, who subsequently contracted an æstivo-autumnal infection.

Bastianelli and Bignami then conclude that in tertian fever there are certain large pigmented parasites which are incapable of multiplying in man. These are divided morphologically into two types—the macrogameti, with large vesicular nucleus and small amount of chromatin, representing the female, and the microgametocytes, with more abundant chromatin, representing the male. After mosquitoes suck the blood from a patient with tertian malaria, fecundation takes place in the middle intestine (stomach) by one of the six microgameti fertilizing the macrogameti. After fertilization of the macrogameti the latter contract and enter the stomach-wall, where they undergo the developmental phases as described for the proteosoma by Ross.

They are able to determine readily whether the parasite in the *anopheles claviger* are of the tertian or æstivo-autumnal form. They have demonstrated that the tertian malarial parasite of man is readily cultivated in the *anopheles claviger*, and that this mosquito is capable of conveying the infection to man.

There is now positive experimental proof that two mosquitoes—*anopheles claviger* and the *anopheles pictus*—are capable of conveying æstivo-autumnal fever to man, the former apparently more commonly than the latter. It is also just as firmly established that the *anopheles claviger* is the conveyer of tertian infection. It has been further shown that the infection can be conveyed by the mosquito to man and from man back to the mosquito, thus completing the cycle of development and firmly establishing the mosquito theory.

The mosquito theory having been definitely established, it is only natural that some one should come forward and suggest some practical method for the extermination of the mosquitoes which convey the infection, and thus to wipe out the disease at least in certain localities. Ross,[20] who first gave the mosquito theory a firm foundation by his experimental work, also has the honor of being the first to suggest a means of exterminating the mosquito, the infecting agent.

He now believes that the mosquito is the definitive host, and man the intermediate host, of the malarial parasite. The cycle of develop-

ment is then analogous to that of the *tænia solium* and the *trichina spiralis*, where swine constitute the definitive host and man the intermediate host.

I quote Ross as follows: "Needless to say we can never hope to exterminate them by catching and killing them individually. But fortunately there is a very vulnerable stage in their career, before they reach their winged condition—that is, when they are water insects—the little wriggling larvæ found in pots and tubs of water, and in stagnant puddles. These larvæ take about a week to mature in the water. When mature they rise to the surface and become the adult winged insect and fly away. The females feed on men, cattle, or birds, and can live for weeks or even months, laying eggs a few days after each meal. Now it is hopeless to attempt their destruction when they are winged, but our knowledge of their life history leads us to suppose that if we could make arrangements to empty out once a week all the tubs of water, the ditches, the puddles, and wells within a given area, we should be able to exterminate the larvæ within that area at least for a time, and therefore, also, we should be able to exterminate, at least to a great extent, the adult mosquitoes."

From his observations in India, Ross found that all the more common forms of mosquitoes belong to the two genera of the zoological family of the *culicides*, namely—genus culex and genus anopheles. The most common species is the culex. The adults have certain characteristics which readily distinguish them. Their eggs are laid on the surface of artificial collections of water, such as pots and tubs of water, cisterns, wells, and drains. The larvæ, so far as he has observed, float head downward when resting on the surface of the water. The genus culex is extremely common in towns and villages.

Mosquitoes of the genus anopheles differ morphologically from those of the genus culex, and are most common in the rural regions. Their larvæ are scarcely ever to be found in artificial collections of water, but only in natural ponds and puddles. Consequently they are much less common in towns and more frequent in the country. Their larvæ do not float head downward, as is the case with the culex, but float flat on the surface of the water like sticks, an important difference—due to the absence of the breathing tube in anopheles—which enables one to distinguish the larvæ at a glance, and consequently the pools in which they breed. Ross found that it was difficult to obtain larvæ of the anopheles. The reasons for the scarcity of the larvæ of the anopheles appeared to be that the puddles (*a*) must be large enough to be permanent for a few days, to allow the larvæ to mature; (*b*) must not be so large as to contain minnows (which devour the larvæ with avidity); and (*c*) must not be liable to be scoured out by every shower of rain.

The interesting point is that up to the present only mosquitoes belong-

ing to the genus anopheles have been found to contain malarial parasites, and to possess the power of transmitting the disease. Ross states that if future experiments show that malaria is confined to the genus anopheles the task will be much simplified, and there would be a chance of exterminating the whole genus, at least in a given locality. This would be done by attacking the larvæ, which, as already stated, can be readily recognized in the breeding-pools.

Ross is of the opinion, from the evidence at hand, that there are good prospects of annihilating the *anopheles claviger*, and, consequently, also malarial fever, in a given locality, by removing their natural breeding-pools and preventing their reformation.

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REVIEWS.

VACCINATION, ITS NATURAL HISTORY AND PATHOLOGY. Being the Milroy Lectures for 1898, delivered before the Royal College of Physicians of London. By S. MONCKTON COPEMAN, A.M., M.D. Cantab., M.R.C.P., London. Pp. 257, xii. plates. New York: The MacMillan Company, 1899.

THE chief object of the preparation of these lectures and their publication in a volume was, as stated by the author, to review the accretions to our knowledge on the subject of vaccination, more particularly from the stand-point of pathology, and to direct attention to certain changes in the regulation and practice of vaccination which have obtained during the century following Jenner's discovery. While it is questionable whether any real improvements during this time have been added to the principles taught by Jenner, excepting, of course, the application of antisepsis, which was unknown in his day, yet in reading the book one could not fail to be interested and instructed in the account it contains of the history of smallpox, the relationship of variola and vaccinia, the history of various vaccine lymph stocks, animal vaccination, and glycerinated lymph. An appendix is added containing an elaborate description of the preparation and storage of glycerinated calf-lymph incerta in European countries. Also in an appendix, as well as in other parts of the book, may be found an interesting account of all that is known at the present time concerning the bacteriology of vaccine lymph.

Before the discovery of vaccination no disease was more common, more fatal, nor more dreaded than smallpox. As the author truly says, it would be difficult to give a more vivid illustration of the state of affairs previously existing than are given by Macaulay when he said "That disease, over which science has since achieved a succession of glorious and beneficent victories, was then the most terrible of all the ministers of death. The havoc of the plague had been far more rapid, but the plague had visited our shores only once or twice within living memory, and the smallpox was always present, filling the church-yards with corpses, tormenting with constant fears all whom it had not stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to her lover."

It is not easy to estimate very accurately in populous countries the ratio of deaths to the living population during the prevaccination age, since epidemics followed each other in such rapid succession that at each reappearance of the disease very many persons enjoyed immunity by reason of a previous attack. In order to illustrate the full effects of an epidemic of smallpox when not thus hampered by a general immunity, the author cites the case of Iceland, which, owing to its isolated posi-

tion, escaped an invasion until the years 1707-1709, when, out of a total population of 50,000 not less than 18,000 persons died of this disease.

Previous to the discovery of Jenner, it was noticed in England and in other countries where epidemics were frequent that smallpox was to a great extent a disease of childhood. This was not because children were naturally more susceptible, but because a large proportion of the older persons had already had the disease. In certain epidemics which occurred in various parts of England during the eighteenth century it is recorded that the vast proportion of deaths was contributed by children under ten years of age. The author refers to epidemics at Warrington and Chester, in 1773 and 1774, in which not a single death occurred in a person above that age; while of the 202 deaths at Chester, one-quarter of this number were infants under twelve months. Instances of like results are mentioned in the final report of the Royal Commission on Vaccination, one particularly, in which only 7 deaths out of a total of 622 occurred in persons above the age of ten years. It should be stated that these figures embrace the aggregate of the deaths of several epidemics which occurred between 1729 and 1763. Reference is also made to the burial registers of the grave-yards of St. Cuthbert's, Canongate, and Buccleuch Street, Edinburgh, which show that during the years 1764 to 1783, of every 1000 deaths from smallpox, at all ages, no less than 993 were of children below ten years of age.

This condition of affairs has been entirely reversed by vaccination. Whenever epidemics occur to-day in civilized countries the vast majority of deaths are contributed by persons above the age of ten years. Dr. Gregory, after an experience covering a period of twenty years as Physician to the Smallpox Hospital of London, and including over 6000 cases, says he never saw more than three or four cases of varioloid in vaccinated children under eight years, and these recovered. It has been estimated that children under five years, including the unvaccinated, now supply only 3.07 per cent. of the deaths from smallpox, and adults of from twenty to sixty years of age, 77 per cent. Mortality from this disease among well-vaccinated children under ten years old is exceedingly rare, so that practically all the deaths that occur within this age-limit must be accounted for by the unvaccinated. These statements could be supported by additional statistics did space permit.

Jenner was mistaken when he said that the protection from vaccination was permanent, or, at least, as much so as a previous attack of smallpox. Nothing but long experience could determine this, and we now know that after efficient vaccination in infancy there is, in the majority of persons, a gradual progress from safety toward danger as time elapses, particularly when the age of puberty is passed, so that in order to maintain protection it is necessary to revaccinate once, if not oftener, after the period of childhood.

The value of revaccination is attested by incontrovertible evidence. But for vaccination and revaccination the percentage of physicians who take smallpox would be vastly greater than it is, for they are much more exposed than other people. In smallpox hospitals the physicians, nurses, and attendants rarely, if ever, contract the disease if they are careful to be revaccinated before being assigned to duty. Dr. Gayton, of London, says that at the Smallpox Hospital in 1871 to 1877, out of 366 people employed, all but one were revaccinated, and

that one took smallpox. Marson, in his connection with the hospital for thirty-six years, saw no nurse or attendant attacked, all being protected by revaccination. Other smallpox hospitals have reported the same experience. Apart from hospitals, Prussia furnishes the strongest proof of the efficacy of this protective agent. In that country vaccination has been required, and revaccination made compulsory in the army since 1834. The school children must be vaccinated, and, at a certain age, revaccinated. As a result the mortality from smallpox has been reduced to seven per million of the population, and there has been no mortality from that disease in the army for many years. Revaccination is therefore such an essential part of vaccination that it would seem impossible to write a book on the latter without considering the former, and yet the author has not discussed at all the question of revaccination.

The book, however, will be highly valued for the very full and complete description it contains of the preparation and advantages of glycerinated lymph. The author's researches on the effect of glycerin in purifying vaccine lymph were already well known from his previous publications. He claims to have demonstrated conclusively that by the admixture of calf-lymph and pure glycerin, and storing the mixture under conditons which exclude light and air, the extraneous organisms in the lymph gradually diminish, and by the end of four weeks entirely disappear, leaving the specific vaccine principle unimpaired. The micro-organisms most commonly found in calf-lymph, if not collected at too late a period, are the staphylococcus aureus, albus, cereus albus, and cereus flavus. The streptococcus of pus is said to be only rarely found. With reference to the question of the possible presence of the tubercle bacillus, the author is not aware of any authentic account of its having been found in vaccine lymph from any source whatever. His experiments, however, show that when large quantities of virulent cultures of tubercle bacilli were purposely added to glycerinated lymph they were effectually destroyed after a period of from four to six weeks. In like manner the streptococcus of erysipelas, if present by accident, yields to the germicidal action of the glycerin. As the bovine animal is not subject to syphilis, the danger of inoculating that disease by the use of calf-lymph may be entirely eliminated. If, therefore, the claims regarding the bacteriological purity and clinical activity of glycerinated lymph are supported by further investigation and experience, this preparation will certainly supersede all other forms of vaccine virus. But until its superior value is clearly demonstrated by experience, the older methods of collecting and preserving lymph should not be wholly abandoned. We have several times seen excessively sore arms from the use of glycerinated lymph prepared in this country—much sorer, indeed, than were ordinarily seen years ago from the use of long humanized virus. This does not seem to be in accord with the claims of the bacteriological purity made for glycerinated lymph. As to its increased clinical activity over bovine lymph preserved on ivory points there is no question.

The author undoubtedly deserves great credit for his original work in the matter of preserving and purifying vaccine lymph. The account he has given of this investigation alone will secure for the book a warm welcome by every student of vaccination, as well as every propagator of bovine lymph. W. M. W.

LEHRBUCH DER NERVENKRANKHEITEN. Text-book of Nervous Diseases. By PROF. DR. H. OPPENHEIM, Berlin. Second edition. Pp. 975; 287 illustrations. Berlin: S. Karger.

DISEASES OF THE NERVOUS SYSTEM. By DR. LUDWIG HIRT, Breslau. Translated by DR. AUGUST HOCH from the second German edition. Pp. 700; 181 illustrations New York: D. Appleton & Co.

AMERICAN SYSTEM OF PRACTICAL MEDICINE. LOOMIS-THOMPSON. Vol. IV. DISEASES OF THE NERVOUS SYSTEM, MUSCLES, AND DYSCRASIÆ. Pp. 1100, illustrated. New York and Philadelphia: Lea Brothers & Co.

NERVOUS AND MENTAL DISEASES. By ARCHIBALD CHURCH, M.D., Chicago, and FREDERICK PETERSON, M.D., New York. Pp. 843; 305 illustrations. Philadelphia: W. B. Saunders.

WITH these four large volumes fresh from the minds of their respective authors, and from the printing-presses of this country and Germany, the inquiring student of neurology and the practitioner of medicine seeking light cannot complain that there is dearth of effort to satisfy their respective requirements. Never before has there been such prolificness in the manufacture of neurological literature. When it is remembered that the past five years have not been particularly fruitful in adding to our knowledge of the natural history of nervous diseases, their causation and treatment, this evidence of breathless activity is not easy to understand. Happily, it is not our duty to interpret the reason for a book's existence, but to give a personal estimate of its worth, to state its claims for recognition by workers in the same field, and to seek for qualities in it that may commend it to the practitioner of medicine. From this point of view the task before us is not a difficult one.

Of the four volumes above mentioned, the two first named—made in Germany—are already well known in this country, especially to teachers and neurologists. On their original appearance it was generally conceded that they merited the praise which was given them unstintingly, both at home and abroad. Were it not for purposes of contrast with the home products further consideration of these volumes might be dismissed by saying that the changes made in these editions have brought them well up to the date of their respective publications. It may be truthfully said that it would be scarcely possible at the present time for anyone to make a text-book of neurology along the same lines and within the same compass superior in its presentation of the facts, more accurate and true in its delineation of disease, and more trustworthy in its directions for treatment than the Lehrbuch of Oppenheim. It has its imperfections and omissions, but they are so enormously overshadowed by its possessions that we refrain from mention of them. The chapter on meningitis is scarcely an accurate and complete reflection of what is known of this affection to-day. Deserved praise is accorded it by saying that it compares most favorably with the treatises of Gowers, Dana, Mills, and Grasset.

Hirt's volume commends itself particularly for its faithful portrayal of the anatomy of nervous diseases and its graphic descriptions of the symptomatology. The handiwork of the indefatigable student, the keen critic, and the broad-minded physician abreast of the progress of the work in his chosen field is evident in every chapter. It is a book

that appeals far more to the teacher and student of neurology than to the undergraduate student and practitioner of medicine. Its most striking shortcoming as a text-book lies in the wholly inadequate consideration which it gives to the causation of nervous diseases. It is to be regretted, likewise, that we do not always find it a sufficient and safe guide in the treatment of nervous diseases. In support of this statement we may cite a specific example—the treatment of exophthalmic goitre. Fully apprised from personal experience and knowledge of the experience of others of the results which follow surgical interference in the treatment of this disorder, we demur to the statement that "The most important part of the treatment is total or partial removal of the thyroid gland." Total removal constitutes malpractice, and it is not vouchsafed any man to say just how much permanent benefit will follow partial removal in every case. Not one word is said about the necessity of plan and precision in the treatment of this neurosis, or of the use of aconite, restoratives, and rest in bed, which the reviewer, in common with many other therapists, can state, from no inconsiderable experience, are of greater service in the treatment of this strange disease than any other measures. We desire not to lay ourselves open to the charge of hypercriticalness in selecting one subject for disapproval. We might as well have taken the author's paragraphs on the treatment of sciatica or tic douloureux, which are wretchedly and wholly inadequate. To-day it is generally conceded that more can be done to add to the usefulness and comfort of patients with locomotor ataxia by methodical and persistent use of the Fraenkel method of purposeful exercises than by any other measure. Yet not one word of reference to this method is there in this volume. These shortcomings of Hirt's book may be accounted for in a measure by the fact that the material of the book in the present form left the author's hand (we surmise) in 1894. But as 1899 is printed on the title-page, it might naturally be inferred by him who reads while running that the book is new, or at least has been carefully revised. It is a matter of great regret that the author did not revise his book and bring it in all parts up to date before this American publication. The book has so many qualites to commend it that we are loath to say that in its present form we cannot recommend it to students and practitioners as an adequate consideration of nervous diseases.

The fourth volume of the Loomis-Thompson system, which is taken up largely with the consideration of nervous diseases, maintains the high standard of its predecessors and merits similar approbation. Were all of its chapters as meritorious as some, this volume would rank as one of the most commendable and trustworthy expressions of the status of neurological teachings at this time. Unfortunately, the work of the twenty-four contributors is very uneven. Some of them, apparently, had a fitting realization of what was expected of them, and did their work very well. Others, from lack of training, inclination, or ability, did their allotted share very badly. Then there are not a few of the contributors whose productions fluctuate from one pole of this estimation to the other. In the first category particular mention should be made of the chapters on the "Diagnosis and Localization of Spinal Cord Diseases and Anterior Poliomyelitis," by Dr. M. A. Starr. They are a credit to the author, and they enhance the value of the book; of the chapters on the "Diseases of the Membranes and Bloodvessels of

the Spinal Cord," by Dr. C. A. Herter, which bear the imprint of much original thought, of careful preparation, and of scientific statement; of the article on "Neurasthenia," by Dr. J. J. Putnam, which is a credit to American neurology; and of the article on "Arthritis Deformans," by Dr. William G. Thompson, one of the best, if not the best, in the English language. As for those constituting the second category, we shall spare ourselves the pain of mentioning them. Fully realizing the immense labor which must be expended in editing a system of this sort, and aware of many of the obstacles in the way of its successful issue, we might easily be persuaded to say nothing of the choice of some of the subjects and of the space devoted to others in this volume. There are, however, one or two things which we believe to be errors of judgment on the part of the editors. To illustrate our meaning, we take the article on "Sexual Psychoses," by Morton Prince, M.D., an article with the title and matter of which we have no fault to find. But what reason can be offered for devoting twenty-one pages to the discussion of a subject with which the medical student and medical practitioner (unless he happens to be an asylum physician) have practically no concern. The average practising physician will probably not be called upon once in a lifetime to minister to the needs of this class of people. Therefore, we are of the belief that space spent in the discussion of such a subject as this in a volume intended for students and practitioners of medicine is thrown away, and life's handicap increased by having to wade through so much disgusting literature. Contrast this with the discussion of the relation of syphilis to disease of the nervous system, which is surely one of the most momentous questions that offers itself to the practising physician, and one that he has to attempt some solution of almost daily. Yet this subject receives scarcely any consideration in the volume before us. Or, contrast it with the subject of "Sciatica," which is discussed most indifferently and with entire inadequateness. We regret that space was offered in this series for the discussion of the subject of sexual perversion, for we are of those who believe that the physician has less call to concern himself with it than the priest or the socialist. Indeed, in the vast majority of cases it comes more within their province than within ours. Before taking leave of this volume, we desire to say that, taken all in all, it is one of the best composite medical books that have so far been produced. It compares most favorably with Allbutt's *System of Medicine*, which is contemporaneous, and practically of the same scope. If we were called upon to decide between the two, we should favor the Loomis-Thompson system, national prejudice being put aside.

The volume of Church and Peterson is not the joint work of two authors. It consists in reality of two monographs under one cover. Dr. Church is the author of the part devoted to nervous diseases, while Dr. Peterson has written the section on psychiatry. Each part, therefore, bespeaks separate consideration. It is difficult to make an estimate of the worth of Dr. Church's contribution, reviewed from the standpoint of the student and the neurologist. It is no easy matter even for a master of style and an adept in brevity and compression to encompass within 600 pages an adequate and reliable presentation of the subject of nervous diseases. We cannot say that the author has succeeded in doing so. There is ample evidence in every chapter of wide reading

and large clinical experience, but at the same time there are far too many evidences of haste in construction and of lack of proper pruning. Naturally, we do not expect the polish of an Addison or the directness of a Clifford in a medical text-book, but there is really no excuse for the repeated use of involved sentences. The following may be taken as an example (the author is describing the gait in the paraplegic state, a paradox in itself): "The pelvis is tilted to the opposite side, and the limb is then brought or dragged to a position under the centre of gravity like a rigid pendulum. It may even be aided by the hand. As it advances it is shaken by clonic movements, and when planted these may cause it to execute several dancing steps before it is securely placed, during which the heel is forcibly elevated and the patient may be bodily jostled up and down. In nearly every respect the gait is the opposite of the steppage of multiple neuritis."

This may have a definite meaning to the writer, but it has none for us. That we may not be thought to have sought out a particular page or sentence, we quote at random from another page in the description of the symptoms of caisson disease: "The disturbance varies in intensity from slight giddiness and neuralgic pains to cross myelitis." While this may be taken as an example of looseness of statement: "Various springs and watering-places have gained a reputation in the treatment of the sciatic neuritis. All furnish hot baths and much rubbing or rude massage."

There is nothing particularly new in the arrangement of the book, and what is does not especially commend itself. For instance, placing the diseases of the coverings of the brain (called the cerebral meninges) and of the cranial nerves together to form Part I. cannot possibly be of advantage. No more can the classification of hæmatomyelia, myelitis, thrombotic softening of the cord, the paraplegic state, and tumors of the cord and its envelope in a separate chapter labelled "Indiscriminate Spinal Cord Lesions." Why such conditions, which are anatomically, clinically, and therapeutically so unlike, should be jostled together in one chapter is difficult to understand. The author's classification of the muscular atrophies into progressive muscular atrophy, due to lesion of the spinal gray matter, and progressive muscular atrophies not marked by striking histological cord lesions, and their consideration under "Lesions and Disease of the Spinal Gray," does not seem to us consistent with the status of our knowledge of the muscular atrophies and dystrophies, imperfect and inadequate as it is.

In truth, we find ourselves in an uncomfortable predicament in being called upon to review this book. We cannot truthfully say that it merits the approbation that a number of American text-books on neurology have received within the last ten years. It contains the materials for a first-class book, but there are too many evidences of immaturity and haste and lack of deliberation for it to receive favorable consideration. Altogether, the best part of Dr. Church's work is that devoted to the eliciting of the patient's complaint and to the examintion.

Dr. Peterson's contribution is contained in the last 200 pages of the volume. It is a straightforward, full, up-to-date consideration of the subject of insanity and idiocy, which will meet the requirements of the student and general practitioner. We prophesy that it will find the favor with them that it deserves. The author avoids the pitfalls of so many writers on insanity who waste their substance on classifications and dis-

sipate their mental energies on definitions. He considers the subject under the eight following heads: Mania, melancholia, circular insanity, epileptic insanity, dementia, general paresis, paranoia, and idiocy. The chapter on the general etiology of insanity is the best in the book; the chapter on paralytic dementia the poorest. In the former the author has given the results of his own work, much of which has been original, supplemented by a careful presentation of the work of others. The same cannot be said of the latter. The chapter on paranoia is extremely commendable. The entire volume is illustrated by a series of photographs, most of them original with the author, which add materially to the value of the book. J. C.

Ocular Therapeutics. By F. W. Ohlemann, M.D., Minden, Germany. Translated and edited by Charles A. Oliver, A.M., M.D. Philadelphia: P. Blakiston's Son and Co., 1899.

It is a well-recognized fact that the longer one is engaged in prescribing remedies the fewer drugs are employed. Works like the one before us tend to prevent this in a measure, and serve to recall to the attention of the practitioner many excellent drugs and procedures which have been permitted to fall into disuse. The author has collated a remarkably large number of formulæ, and has arranged them in a manner which is very convenient for reference.

In the ordinary text-books it is quite impossible to mention other than the remedies which are usually employed in combatting each disease, so that when these fail to accomplish a cure the practitioner is often at a loss for further expedients. It is then that Ohlemann's work will be appreciated, for one will find there a great variety of methods which have been prepared for the treatment of every form of ocular disease. The task of the American edition has been very well performed, and the book will undoubtedly be a valuable adjunct to every ophthalmologist. W. C. P.

A Practical Hand-book on the Muscular Anomalies of the Eye. By Howard F. Hansell, A.M., M.D., and Wendell Reber, M.D. Twenty-eight illustrations and one plate. Philadelphia: P. Blakiston's Son & Co., 1899.

This monograph is undoubtedly one of the most important which has appeared in ophthalmology for some time, as it is the first to treat of the eye muscles from a clinical stand-point, and may be said to reflect the opinions which are held by the more conservative ophthalmologists of the country upon this much-mooted subject. It is a source of gratification, therefore, that such a work has been penned by Americans, as our countrymen really inaugurated and perfected the treatment of errors in the muscular apparatus of the eye. One must confess to a great feeling of relief, also, to find that the subject so often contorted and exaggerated elsewhere has been treated in a thoroughly dispassionate yet masterful tone.

After a sufficient and satisfactory description of the anatomy and physiology of the external muscles of the eyeball, the authors devote the main portion of their monograph to the consideration of functional anomalies of the eye muscles, and give copious but succinct accounts of the different methods and apparatus employed in the detection and estimation of insufficiencies. It is here that the ophthalmologist, expert and tyro as well, will find an exposition which will force the conviction upon him that a case is but half studied if the proper estimation of the muscular condition has been neglected. W. C. P.

Retinoscopy in the Determination of Refraction at One Metre Distance with the Plane Mirror. By James Thorington, M.D. Third edition, revised and enlarged. Forty-three illustrations, twelve of which are colored. Philadelphia: P. Blakiston's Son & Co., 1899.

To one skilled in its use, retinoscopy is such a rapid and accurate method of determining the refraction of the eyes that it is not strange that two editions of this excellent brochure have been already exhausted. The author is one of the best known exponents of the test, and his teachings, so well expressed in the text-book before us, should enable one to gain a clear idea of this essential of ophthalmology. W. C. P.

Progressive Medicine. A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by H. A. Hare, M.D. Vol. ii., June, 1899. Philadelphia and New York: Lea Brothers & Co.

The second volume of this quarterly is taken up with the discussion of the surgery of the abdomen, including hernia, by Dr. William B. Coley; gynecology, by Dr. John G. Clark; diseases of the blood, diathetic and metabolic disorders, diseases of the spleen, thyroid gland, and the lymphatic system, by Dr. Alfred Stengel; and ophthalmology, by Dr. Edward Jackson.

Dr. Coley presents his views of the subject in 140 pages. Thoroughness and completeness are its distinguishing features. Particular reference must be made to the illustrations, many of which are equal to those of the most recent books on surgical technique. Dr. Clark's contribution is presented in a little more than 100 pages. One of the most commendable features of this review is the discussion of the influence of castration upon the female constitution. The review of the diseases of the blood and of the ductless glands are handled in a way that leaves nothing to be desired. Leukæmia and diabetes mellitus particularly receive most extensive consideration. The advances in ophthalmology take up 80 pages, and constitute an adequate presentation of the subject. Altogether, the second volume of this series is fully deserving of the merited praise awarded to the first, and the series will no doubt receive wide-spread recognition from the general practitioner and specialist, to both of whom it must prove of great service. J. C.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Primary Carcinoma of the Pancreas.—The difficulty of diagnosing cancer of the pancreas is emphasized by the following case: In September, 1896, a retailer, aged fifty-seven years, complained of feeling tired and weak; he had a constant pain in the loins, and often in the right hip, which radiated to the posterior surface of the thigh; he also had lost some weight. He was a drinker, but without objective signs of alcoholism. In the winter of 1886 he had a severe diffuse bronchitis lasting several weeks. In the fall of 1893 he had repeated rheumatic pains in the back and both legs. There was no hereditary taint. The skin was of a dirty gray color, dry and inelastic. On the mucous membrane of the lower lip was a dark blue spot, about the size of a pinhead.

Nothing of importance was found in the examination of the thorax. The edge of the liver could be felt on deep breathing. The spleen could not be palpated. The urine was always free from albumin, sugar, and bile. Fat was never found in the stools. The patient vomited once, as a result of indigestion, the vomit containing free hydrochloric acid. From the above data the author made the diagnosis of probable Addison's disease. During August, 1897, the patient had repeated attacks of severe cardialgia, which caused the author's colleague to think of gallstones. Within two years the patient lost forty-three pounds. The skin became dirty yellow in color, so the diagnosis of Addison's disease was given up and replaced by that of occult cancer. The pain in the back continued, but the epigastrium was never sensitive. A tumor could never be felt. The appetite was always good. Death occurred July 21, 1898, with signs of extreme exhaustion. The important findings at the autopsy were chronic catarrh of the stomach and a primary carcinoma of the head of the pancreas about the size of the fist. The tail of the pancreas was likewise carcinomatous, yet the structure of

the gland was in part recognizable. The tumor was close to the stomach, but had not attacked it. It was adherent to the liver. The retroperitoneal and mesenteric glands were as large as hazel-nuts, and were carcinomatous. The intestines, liver, spleen, kidneys, and adrenals were free from cancer. There were no gallstones. The microscopical examination proved the growth to be scirrhous. In the abdomen the growth lay behind the left lobe of the liver and the stomach, so that it was impossible to feel a tumor until these organs were removed. Since there was neither excess of fat in the stools nor signs of compression, cancer of the pancreas, a rare primary tumor, was not considered. Nor was there sufficient evidence for a diagnosis of cancer of the gall-bladder or stomach. The intestines were excluded as the seat of growth, since no tumor could be felt. There were no signs of stenosis, such as difficulty in defecation or the passage of blood or mucus. A diagnosis of cancer of the pancreas should have been made, first by exclusion, and secondly because a secondary neoplasm in this organ is quite common. As a rule (Strümpell), the head of the pancreas is the portion involved. In fifty-seven cases the head was involved in thirty-five (Madelung.) Williglk, in 467 autopsies on cancerous subjects, found only twenty-nine in which the pancreas was diseased. The tumor may compress the stomach, small intestines, vena porta, vena cava, gall-duct, and the neighboring nerve plexuses, causing severe cardialgia. In Rahn's case the cardia was compressed, causing a dilatation of the stomach. Récamier reports a case in which the tail of the pancreas was involved, causing compression of the left ureter and left-sided hydronephrosis. Pehl's case pressed the stomach against the anterio-abdominal wall, causing symptoms of incarceration. A differential diagnosis between cancer of the pancreas, stomach, and omentum is possible. Friedrich and Strümpell have often failed to find fat in the stools of patients who had extensive cancers of the pancreas. In Da Costa's thirty-seven cases there was vomiting twenty-two times as a result of simultaneous disease of the stomach, jaundice twenty-four, indigestion twenty-five, dropsy fifteen, and severe epigastric pain thirty-two times.—*Münchener med. Wochenschrift*, 1899, No. 5.

Tuberculous Meningitis.—Waibel (*Munchener med. Wochenschrift*, 1899, No. 5) describes a case of this disease which is of unusual interest and importance because of its medico-legal bearing. The District Court called for expert testimony as to whether tuberculous meningitis could be caused by trauma. March 4, 1898, a school-girl was struck upon the head by a companion so severely that everything looked black before her eyes, and the left ear became red and swollen. Although the child had always been previously healthy, she complained of severe pain in the head, but continued to go to school. On the third day after the injury, toward evening, the child vomited three times and took to bed. Previous to the injury the child had always been cheerful and lively, but from the day of the blow she became depressed, and moaned and wept frequently. At times the patient complained of pain in the head, especially in the forehead. With the exception of weakness and constipation, examination revealed nothing on which to base a diagnosis. On March 13th the expression was dull, and there was a peculiar brilliancy in the eyes. The color changed frequently, the pulse was normal, the tem-

perature 38.5° C.; the lungs and spleen were normal. On March 14th the mind was cloudy, and the child groaned and shrieked frequently, and complained of a very severe pain in the head. The heart was frequently irregular, at times intermittent, and the breathing was somewhat irregular. The pupils were normal, and the temperature 38.5° C. On this date a diagnosis of meningitis, with a bad prognosis, was made. On March 15th the patient was weaker, still conscious, but apathetic and without rigidity of the neck. This condition continued with variation till the 23d. The temperature gradually increased to 39° C.; the abdomen became scaphoid, the pulse was at times regular, then irregular, and again intermittent and moderately infrequent. The breathing was more irregular, being at times superficial and rapid, then very deep. The consciousness was tolerably undisturbed. From March 24th the child became much worse, remaining entirely unconscious for hours; there was slight convulsive spasms in the extremities, and the child frequently grasped at the air and picked at the bed-clothes. The legs showed slight spastic symptoms; the pupils were often larger than normal and unequally dilated; the eyes frequently turned upward. During the last few days there was almost entire unconsciousness, the pulse was very rapid and small, the patient dying March 30th, twenty-six days after the injury. The autopsy findings were as follows: The meninges were congested, the posterior veins especially being markedly filled. In both lateral ventricles there was a large amount of clear fluid, causing distention. The meninges at the base were infiltrated with a gelatinous exudate, and showed very small miliary tubercles, especially numerous along the course of the vessels. The convolutions were somewhat flattened. The lungs were markedly distended, and showed rather numerous gray tubercles on the clear red cut surface. The bronchial glands were as large as hazel-nuts, with cheesy, yellow tuberculous masses throughout, partly softened in the centre, so that a small cavity could be seen. The heart and abdomen were negative.

The author considers the bronchial glands as the primary focus of the disease, from which the meningitis and general tuberculosis developed, and thinks that the trauma produced a disturbance of the brain and the chest which made it possible for the tubercle bacilli to enter the neighboring blood and lymph vessels, and be carried over the entire body, especially to the brain, and there grow. The following points favor the traumatic origin of the disease in this case: 1. The child was previously healthy, without emaciation, cough, headache, fever, or changes in its disposition. 2. From the moment of injury she complained of headache, dizziness, and weakness, and three days later vomited and had disturbances of sleep. From this time the symptoms appeared and increased in severity. 3. According to the experiments of Koch and Baumgarten tubercles in the brain and other organs require about ten to twelve days for their growth. In the present case the first severe brain symptoms appeared on the tenth day of the disease. 4. A number of similar cases of traumatic brain tuberculosis have been observed and reported. The author and a medical committee from the University of Munich testified that they believed the disease was in this case caused by the trauma, but that there was no conclusive proof, as there is no characteristic difference between a tuberculosis meningitis caused by trauma and the spontaneous variety.

Insufficiency of the Heart Muscle.—MARTIUS (*Klin.-therap. Wochenschrift*, 1899, No. 16), in a thoughtful paper on this subject, describes the following varieties: 1. Pure acute insufficiency of the heart-muscle as the result of over-work or over-exercise. This occurs more easily in untrained persons, but even the heart of the trained man has its limits. Acute strains of a healthy heart rapidly recover under rest, but oft-repeated strains lead to permanent weakness. In such cases the contrast between the forcible apex-beat and the weak pulse is characteristic. 2. The acute heart-muscle insufficiency which forms the essential and primary cause of paroxysmal tachycardia. The enormous frequency of the pulse is secondary. The sudden disappearance of the cardiac dilatation is followed by the disappearance of the apex-beat, and a slowing with increased force of the pulse. The contrast between apex-beat and pulse appears and ceases with the attack. 3. Henschen has called attention to a dilatation occurring in young, weak, and anæmic girls as the result of over-work, but which develops slowly, remains long, and serves to assist in the production of dilatation as the result of relatively trifling causes. Loss of energy, palpitation, dyspnœa on exertion, headache, and loss of appetite are common symptoms, and gastric ulcer and severe anæmia possible consequences. 4. Cardiac weakness, with dilatation, occurs in children as the result of primay insufficiency of the heart-muscle. It occurs in weak and predisposed children without demonstrable cause. Though G. See described this as "hypertrophie cardiaque resultant de la croissance," other French clinicians have recognized that hypertrophy is not a feature of such cases, but that there is really temporary dilatation. Scrofulous children are especially predisposed, and the demands of school-life may be the exciting cause. The children are pale, weak, have loss of appetite and headache, and learn with difficulty. Moderate anæmia, and at times albuminuria are present. Various degrees can be recognized clinically. Highly characteristic is the effect of exercise on the heart in such cases. Climbing stairs may send the pulse up from 80 to 96 to 120 to 140, the objective palpitation increases and the radial pulse becomes impalpable. In severe cases the apex-beat may reach the anterior axillary line. 5. In adults alcohol is the most important predisposing cause, though in this, as in other cases, the effects vary in different individuals.

Malignant Struma, with Severe Hemorrhage from Varices of the Œsophagus.—HELLENDALL (*Deutsche med. Wochenschrift*, 1899, No. 14) reports the following case: The patient, a woman, aged fifty-eight years, had a small goitre since the age of five. During the last six months the tumor grew rapidly, and she vomited blood very frequently. On the first occasion, in the course of three to four hours, she vomited ten washbowls of blood, which at first was dark—later clear red. During the past two months there was swelling of the legs and slight attacks of nocturnal dyspnœa. The patient was very cachectic, markedly cyanotic, and dropsical. On the left leg there were calcified varices. On the anterior surfaces of the neck and thorax there was a large tumor, which extended from the larynx down to the xiphoid process, to the right of the sternocleido muscle, and to the left to the posterior neck muscles, reaching almost to the spinal column. The surface was nodular and covered with large and small dilated veins. The skin

was adherent but not ulcerated, and there were no pulsations. The tumor was of moderately hard, elastic consistence, except at the root of the mamma, where fluctuation could be felt. It was closely adherent to the tissues beneath. The pulse was moderately rapid, and somewhat stronger and fuller left than right. Examination of the heart was negative. There was slight dyspnœa, with exaggerated breathing and an occasional râle. There was exophthalmos. Ophthalmoscopic examination showed haziness of the left papilla and tortuosity of the veins of both eyes. The urine was negative. Subcutaneous trocars were inserted, but the patient died suddenly without dyspnœa or other special symptoms. A diagnosis of malignant struma was made from the anamnesis, the growth of the tumor with the underlying tissue, and the enlarged veins. Autopsy confirmed the diagnosis. The tumor had grown through the sternum and ribs; the jugular veins were thrombosed and vascularized. The œsophagus contained varices extending to about 4 c.m. above the cardia. The tumor in part resembled jelly, and in part marrow, and contained numerous cysts and hemorhages. The tumor had evidently developed from a benign struma. The growth in the thorax and the obliteration of intrathoracic veins caused the most striking symptoms, including the œsophageal varices. Varices of the œsophagus are divided into two classes—congenital and acquired. Both varieties have caused death by hemorrhage. Friedrich reported a case of this kind in a child of six. The acquired variety is divided into those which are associated with old age, and are found along the entire length of the œsophagus, and those which result from stasis in the portal system, as in cirrhosis of the liver, and are located in the lower part of the œsophagus. Cases of hemorrhage from senile œsophageal varices are very rare. The case now reported represents a third variety of œsophageal varices. These are located in the upper two-thirds of the œsophagus, and are dependent upon stasis in the superior vena cava. The cause of stasis in this case was the metastases of the tumor inside the superior cava and its branches. According to Litten the œsophageal veins have two exits; those in the lower portion pass through the intercostal veins to the azygos, while those in the upper part empty into the inferior thyroids, in order to pass directly into the superior cava.

Diagnostic Tuberculin Tests.—Beck (*Deutsche med. Wochenschrift*, No. 9, 1899) reports the results of the diagnostic injection of tuberculin in the Berlin Institute for Infectious Diseases. Since 1891, 2508 persons have been tested; 1525 gave the reaction, but of these 371 had other evidences of tuberculosis; 338 had apical catarrh, and of these 298, or 85.2 per cent., gave a positive reaction. Two patients with intestinal tuberculosis, and five with uro-genital tuberculosis, gave positive reactions. Of 25 cases of laryngeal ulcer, 17 gave the reaction; 63.2 per cent. out of 106 cases of influenza gave the reaction; of 68 cases of pleurisy, 50, or 73.2 per cent., reacted; of 66 cases of bronchitis, 29, or 43.9 per cent.; of 76 cases of pneumonia (in the convalescence), 35.5 per cent.; of 14 cases of emphysema, 4, or 28.5 per cent.; 16 out of 17 cases of tuberculosis of lymph glands gave a positive reaction. In the negative case the disease proved to be sarcoma. Out of 13 cases of adenoid hypertrophy of the nose, 12 gave a positive reaction, and 3 out of 4 cases of ozæna likewise. In 96 cases of facial erysipelas, 52, or 54.2 per

cent., gave the reaction, and in 25 cases of erysipelas of other parts of the body only 7. As in most of the former the disease began in the nose, the author looks on the adenoid growth as furnishing a favorable soil for the erysipelas coccus. One case of Addison's disease reacted to small doses (1 mg.). Chlorotics reacted to the extent of 53 per cent. Out of 127 cases of angina, only 47, or 37 per cent., reacted. Patients with gonorrhœa reacted to the extent of 55.6 per cent.; out of 143 syphilitics, 59 gave a positive reaction. Out of 15 cases of gastric ulcer, 10 gave reactions; in 13 cases of perityphlitis, 7 were positive. Most of the patients were women, and the author thinks that in women, who swallow the sputum more frequently than men, infection of the alimentary canal is especially likely to occur; 44 out of 87 cases of parametritis or perimetritis gave the reaction; 7 out of 20 of oöphoritis. Out of 55 women injected after abortion 11 reacted; 3 cases of lepra gave distinct reactions. The author points out that the results must not be applied generally, but the peculiarities of the service borne in mind. The great diagnostic value of the test is strongly brought out by the extensive series of cases. The later histories of the subjects who could be followed up are promised by the author, and will be awaited with much interest. The method used was the common one of ascertaining the absence of fever after taking the temperature at intervals of two hours for a day or two; then injecting 1 mg. of tuberculin; after one to two days, five and one-half days later, 10 mg. In children the doses are respectively 0.5, 1, and 5 mg. The injection is best given at night, as the reaction occurs about twelve hours later. A rise of at least 0.5° C. characterizes the reaction. If doubtful, the same dose should be repeated in a day or two.

SURGERY.

UNDER THE CHARGE OF

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Nephro-ureterectomy for Traumatic Hæmatohydro-nephro-ureterosis.—SUMMERS (*Medical Record*, July 29, 1899) reports the case of a young woman who fell on a street curb, striking on the right lumbar region, but sustaining such an apparently slight injury that she was able to walk home. Her physician found no alarming symptoms, and not until the following morning, when bloody urine was passed, did her condition become alarming. When seen in consultation she was taking a fair amount of nourishment, but was too weak to rise, with a slight rise of temperature, and a pulse vary-

ing from 84 to 100. She was not seen again for nineteen days, when she came into the hospital; there had been a remarkable change. Although there had been a tumor previously that could be readily detected, it had now reached the proportions of a cystic growth, occupying the lower median part of the abdomen, extending well over toward the left iliac spine and down into the pelvis; it also distended the right side of the abdomen, extending up into the kidney region. The passing of dark, bloody urine had continued. The coloring-matter was from the blood. The diagnosis made was of hydronephrosis from injury to the ureter, yet this did not harmonize with the discharge of bloody urine.

The operation was commenced by an incision extending from the lumbar region above the crest of the ilium a short distance below the anterior superior iliac spine. The tumor was exposed behind the peritoneum, but could not be separated at first. It was punctured by a trocar and canula, and a large amount of fluid removed. A separation of the tumor on the outside showed the ureter to be thickened and enlarged. There was no obstruction or injury to the ureter. The kidney and ureter were useless, and it was decided to remove both. The renal vessels were ligated and divided. The sac was peeled off from the pelvis and the right side of the abdomen, but beneath the peritoneum. The ureter was divided well down. The repair was prompt, but the recovery rather slow, the patient leaving the hospital in about two months quite well.

Every semblance of kidney tissue had disappeared from the tumor, which was a fibrous sac; there was no pyramidal or cortical substance. The alteration and atrophy in such a short time were remarkable. The author has found only one case referred to of such size; in this the patient died.

On the Importance of Plastic Surgery in Renal Distention (*i. e.*, Nephrectasis).—In a most important paper on this subject MORRIS (*The Lancet*, July 1, 1899) communicates his clinical experience in this particular branch of surgery. He deals especially with stenosis of the ureter, although he points out the fact that ureteral obstruction may be due to any of the following causes, which he has observed in cases under his care: 1. A valve formed of mucous membrane and situated near the renal pelvis. 2. Valvular formation caused by the obliquity of the ureter to the renal pelvis. 3. Stricture, including contraction of not more than one inch in length. 4. Ureter compressed by branch of the renal artery, abnormal or otherwise. 5. Calculus impacted in the ureter. 6. Fibrous band on the brim of the pelvis. 7. Twist of the ureter on its own axis. 8. Compression of the ureter by enlarged lymphatic glands situated between the ureter and iliac muscle. 9. A considerable length of ureter converted into an impervious cord. The pathological conditions named in the first four groups of the foregoing are amenable to plastic operations on the ureter and renal pelvis. That of the fifth group is removable by ureterotomy, a very successful operation for stone in the ureter, and now possible, no matter at what part of the ureter the calculus is impacted. A very slight operation after the ureter is once exposed at the involved part would suffice to remove without cutting the ureter itself—such causes as those in groups six and seven. The two last are now the only reasons for performing complete nephrectomy.

The present paper deals with the stenosis due to the first four causes, and is based on successful operations in five cases recently treated. It is premised that a movable kidney, as well as an abdominal tumor, due to hydronephrosis, is frequently an accompaniment of these conditions of the ureter. It is also very important to know that the degree of hydronephrosis is not by any means always sufficient to produce an abdominal tumor either of an intermittent or persistent kind.

Stricture or valvular obstruction of the ureter causes intermittent progressive impediment to the flow of urine, and sometimes results in complete and permanent obstruction. The resulting dilatation is a hydronephrosis or pyonephrosis, according to the presence or absence of septic conditions previous to the impediment. The condition may be diagnosticated if the nephrectasis is sufficiently large to produce a tumor that can be recognized. It is, however, frequently diagnosed as calculous nephritis. This may be the case when the pelvis is dilated to the size of a small orange and the calices the size of nutmegs. When the tumor is detectable the symptoms will probably be ascribed to movable kidney and the true condition neglected.

The etiology of valve formation varies; it may be congenital; sometimes it is the result of morbid mechanical changes in the ureter or renal pelvis. A temporary impediment due to some acute condition may result in the sacculation of the pelvis; it gradually increases, acting by its pressure upon the ureter to increase the intrapelvic urinary pressure till finally the sac becomes so distended that the ureter is no longer at the bottom, but its orifice is high on the side of the dilated pouch. Such a condition rapidly leads to the formation of a valve, and the impediment to the urinary flow rapidly increases. The increased weight of the kidney and pelvis may result in making it movable, and the sharp flexion of the kidney at the point where it is firmly held by the peritoneum increases further the difficulty. On the other hand, a floating kidney may be the original cause of the dilatation and subsequent formation of a valve, and anomalous renal vessels have been found to produce it. The dilatation does not always take place in the pelvis of the kidney, though this is a more frequent situation. Stricture, either acquired from ureteritis or traumatism from a calculus, or other source, or a stricture that is congenital, may produce sacculations of the ureter without there being any definite increase in the pelvis of the kidney.

The symptoms of this condition are variable, depending on the etiological factor of the individual case. Movable kidney may be either a cause or a result of nephrectasis. Many of the patients describe attacks of pain in the loin or groin, recurring at intervals of weeks or months over a period of one or many years. The pain often extends downward over the abdomen from the hypochondrium, spreading to the hip and thigh, and to the labium in woman, and the scrotum and testes in man. The pain is often ushered in with vomiting, or nausea, sweating, or by a general sense of illness, with fever and restlessness, or by a feeling of great coldness, which has been known to continue during the greater part of the attack. The attacks vary in intensity and duration, lasting hours, days, or weeks. During the interval there may be a nearly constant dull ache in the loin. In most cases there is a decrease in the amount of urine during the attack. There may be an increase in the size of the kidney during the attack. The urine may be

quite normal or may contain only a few blood-corpuscles or numerous crystals of oxalate of lime, or it may be dark-chocolate color from the presence of blood and urates. Pus may be found in some cases in small quantities if there has been previous inflammatory conditions. In other cases the urine deposits a thick mucus after standing, and then cystitis is apt to be diagnosed, and the bladder submitted to much useless treatment in consequence.

Tenderness in the flank, especially on bimanual palpation, is a common symptom, whether there be a renal tumor or not. The kidney will be movable, probably, if the symptoms have existed for some time. Pressure over the kidney will elicit contraction of the abdominal muscles. If the stenosis is at the vesical end of the ureter, bladder symptoms will probably predominate, but it should be remembered that they are also excited by obstruction at the upper end of the ureter. The symptoms are increased at menstrual periods, and are liable to be confused with pelvic trouble. The general symptoms are neurasthenic and gastro-intestinal in character.

Operation is the only rational mode of treatment, and this should not be delayed till the hydronephrotic kidney can be detected, or till the kidney becomes movable. Strictures should be incised, and the angles of the cut sewn together as in cases of pyloric stenosis. Valvular folds of mucous membrane should be cut and their edges sutured together, so that the distended pelvis communicates directly with the ureter. In some instances kolpo-ureterostomy may be indicated, or grafting of the ureter into the bladder may be indicated. Finally, nephro-ureterectomy may be necessary when the kidney and the entire length of the ureter are involved in the tubercular disease.

The author tabulates a series of seven cases in which he has operated for stricture of the ureter or for obstruction due to valves.

Two Recent Cases of Successful Operation for Impacted Stone in the Ureter.—FREYER (*Lancet*, July 22, 1899) reports the result of operation in the following cases of impacted calculus in the ureter. A patient, aged twenty-three years, had suffered for nineteen months from renal colic and hæmaturia. He had repeated attacks, which continued in spite of all treatment, and were brought on by very slight causes. When first seen he had been relieved by morphine from an attack in which the pain was excruciating, accompanied by restlessness, nausea, and vomiting, with a constant desire to micturate, but only a small quantity of high-colored urine was passed on each occasion. For two days after this attack the urine was clear, but it became thick and bloody again. He found upon examination a slight movable tumor as large as two fists in the region of the right kidney, which was extremely tender on palpation both in the loin and in front. There was no stabbing pain on pressure at the back, but there was distinct tenderness at one spot in front midway between the navel and the anterior superior spine of the ilium. The urine had the color of Madeira wine; it was acid, specific gravity 1015, and it contained blood-corpuscles and crystals of oxalate of lime, and also albumin. The left kidney was normal. The diagnosis of renal calculus, with blocking of the ureter, was made. The operation disclosed a hydronephrotic kidney, but on opening it no calculus could be detected, although the whole pelvis and the calices could be readily palpated.

A catheter passed down the ureter detected an obstruction four inches below the pelvis of the kidney. A long silver probe detected the calculus. The incision was extended and the peritoneum raised from the ureter. The calculus was found to be the size of a filbert. The ureter was incised and the calculus removed. The ureter was not sutured because of the depth of the wound, the narrowing of the calibre of the ureter, and because its suturing does not always yield good results outside the peritoneum. A large drainage tube was carried from the lumbar incision down back of the kidney to the ureteral wound. The kidney wound was partially closed, permitting urine to flow through the lumbar wound from the kidney. Urine passed by the bladder and by this wound for several days. The tube was gradually shortened, and the patient finally recovered without a fistula.

In the second case the patient was fifty-three years old, and had multiple strictures and suffered from stone for several years. His left kidney had been explored with negative results, with temporary relief, followed by the recurrence of all the old symptoms. The pain in the left loin became very severe, at times radiating to the groin and testicles, and accompanied by hæmaturia, which at times was very profuse. There was occasional pain in the right loin. The urine was extremely thick and offensive, and on standing it deposited about half pus. The left kidney was explored, but no kidney was found, although an extensive and careful search was made. The patient recovered rapidly, with only temporary relief. The multiple strictures were then divided by internal urethrotomy, but without much benefit. Later a cystoscopic examination showed a long pencil-shaped calculus projecting from the ureter into the bladder about three-quarters of an inch. It was caught by the lithotrite, drawn out and crushed, and the débris, which was made up of 12 grains of urates, was washed out. The patient was much benefited by the operation, although there is some cystitis remaining.

The author reports five other cases of calculus in the ureter, four of which were impacted at the entrance into the bladder. One in a female was removed by dilating the urethra and drawing the calculus down into the bladder; the others were in males, and were removed by a perineal incision. In another a calculus was crushed in the bladder of a boy and removed. A second was felt impacted in the ureter, which he proposed to remove by suprapubic cystotomy. It, however, passed into the bladder, and was crushed and removed. In the fifth an obscure cystic tumor of the bladder, which contained two calculi, weighing 41 grains, was removed suprapubically.

A Comparison of the Merits of Suprapubic and Perineal Cystotomy.—DANDRIDGE (*Annals of Surgery*, July, 1899), in comparing the merits of these two methods of entering the bladder, reviews the history of their development and the advantages that have been claimed for each and the arguments that have been advanced against each. He finds that while surgeons are generally in unison regarding the perineal operation, its method and the results obtained by it, there is yet a wide diversity of opinion regarding the best method of procedure in the suprapubic operation, the after-treatment, and the causes of failure or of death that result after it. He believes that unexpected difficulties may be said to be more likely in the suprapubic than in the perineal operation. The wound is longer in healing. The patient

requires more care and attention, and a permanent fistula is more likely to result, and where healing takes place a breaking out again is more liable to occur. With reference to the employment of the two operations, where drainage is the therapeutic measure desired, he prefers the perineal route, because it drains better with the patient in bed, and subjects him to less discomfort. The perineal wound heals more quickly and with less leakage if the tube can be withdrawn. It is less likely to offer difficulty, and its performance takes less time. It affords a better opportunity for permanently removing the cause of obstruction, and so secures a permanent relief without in any way increasing the danger. It is less likely to interfere with the restoration of normal contraction, and is in itself a less dangerous way of opening the bladder. However, in cancer of the bladder, tuberculosis, and hemorrhage, suprapubic cystotomy affords the greater advantage. In comparing these two operations in cases of calculus he would of course prefer the crushing operation to either. When the perineal operation of lithotrity for the crushing of large stones is taken into consideration it would seem as if cutting for stone would be very limited in its application in the near future. He restricts the high operation to stones of most unusual size, to encysted stone, to stones complicating tumors, and to cases where some deformity prevents the perineal operation.

The value of castration and other methods of relief in cases of hypertrophied prostate have reduced the number of cases that should be submitted to any operation considerably. While the high operation has the advantage of making the field of operation visible, it has been found best to combine it with a perineal incision. He considers the perineal route to possess certain decided advantages. It affords better drainage and permits a catheter to be readily introduced when needed. It can be used when drainage is urgently needed, and can be accomplished rapidly, avoiding ether shock. The suprapubic route is to be preferred in removing tumors, as they can be readily reached and hemorrhage controlled.

PEDIATRICS.

UNDER THE CHARGE OF

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A New Treatment of Whooping-Cough.—V. GILBERT (*Revue médicale de la Suisse Romande*, June 20, 1899, p. 373) reports some striking results accomplished in modifying the course and severity of whooping-cough by the administration of antidiphtheritic serum. The first suggestion of the method

came from the beneficial effects secured by the administration of antitoxin in a case of coexisting pertussis and diphtheria. The patient was a child of three and one-half years, who had from twenty-five to thirty paroxysms in the twenty-four hours. On the ninth day of the paroxysmal stage 10 c.c. of antidiphtheritic serum were injected for the treatment of an intercurrent diphtheria. On the following day there were twenty-five paroxysms, and 5 c.c. of serum were injected. The next day only twenty paroxysms were counted, and on the following day only sixteen, when a third injection of 5 c.c. was made. Three days later only eleven kinks occurred, and the night was passed comfortably. Two days later only five kinks were counted, and they continued to diminish in intensity until nine days after the last injection, when there was scarcely any cough, and this had lost its characteristic quality. Eight other observations are given, in seven of which the serum was administered in the absence of diphtheria, and the effect upon the pertussis was quite as striking as in the first case. The duration of the paroxysmal stage never surpassed five to ten days; the number of paroxysms rapidly diminished, falling in the course of six or seven days from twenty or thirty in twenty-four hours to three or four, with almost complete disappearance of the repetitions. The violence of the cough also became greatly modified. Vomiting always ceased after the injections. The remaining slight cough was easily controlled by antispasmodic treatment, preferably by bromoform.

The total quantity of serum employed never exceeded 10 c.c., except in the two cases of diphtheria, in which the larger doses were required. The quantity used at a single injection varied between 2 and 5 c.c., and the intervals were two or three days.

No local disturbances occurred in any of the cases, though the entire contents of a bottle were not used at a single séance.

Secondary accidents were not more frequent than in diphtheria; twice there was urticaria, once arthralgia with erythema nodosum, once extensive erythema of the buttocks and abdomen, once a scarlatiniform eruption, and once a morbilliform eruption. In three cases out of the nine there was no secondary manifestation. These accidents, however, appeared to have had no influence upon the course of the disease.

The employment of antidiphtheritic serum in the treatment of pertussis, the author has discovered, has been exploited by other clinicians. Lotti, of Lecco (*Semaine Médicale*, 1897, No. 24), observed like beneficial effects in a case in which the serum was used for intercurrent diphtheria, and Cerioli, of Broni (*Semaine Médicale*, 1898, No. 41), employed it with excellent results in fifteen cases in which, besides the symptoms of the disease, complications, such as bronchitis, bronchopneumonia, epistaxis, and hæmoptysis were favorably influenced. Whether the results obtained were due to the diphtheria antitoxin or to the blood-serum of the horse, the author does not venture to decide. He asks for more extended observations.

Pott's Disease in the Nursling.—Frœlich (*Annales de Médicine et Chirurgie Infantiles*, January 15, 1899, p. 82) presents an interesting study under this title, based upon twenty-six personal observations. The seat of lesion was always the lumbar segment of the vertebral column, at the first or second vertebræ, twenty-two out of twenty-six times. There is at first always para-

plegia, followed by rigidity of the lumbar region, and then a large lumbar gibbosity, not angular. The paraplegia may be distinguished from infantile palsy by the fact that it affects both legs, is never complete, and the reaction of degeneration is not present. From rachitis it may be differentiated by the freedom from pain on pressure.

When deformity is the first symptom it may simulate rachitic lumbar kyphosis or a transitory vicious attitude. In either of these conditions the lumbar portion of the spine remains supple, and when there is ankylosis in rhachitis it is a lumbo-dorsal cyphosis, which is readily recognized.

Tannalbin in Acute Follicular Enteritis.—COZZOLINO (*Gazz. degli Ospedali*, November 13, 1898) speaks highly of this agent in irrigation of the bowel, using it in the proportions of 1 to 10 per cent. in starch water. When tenesmus is marked, two or three drops of laudanum are added.

The treatment is begun by the administration of small doses of castor-oil or calomel. The lavement of tannalbin should be immediately preceded by a large evacuating lavement of salt solution or sterile water, for the purpose of cleansing the intestine and bringing the drug into more direct contact with the affected mucosa.

He considers his results much better and more rapid than those obtained by the use of the usual astringents, such as tannin, sulphate of zinc, nitrate of silver, alum, or acetate of lead.

Paralysis in Whooping-cough.—HORVENO (*Des Paralyses dans la Coqueluche, Thèse de Paris*, 1899) has collected forty-six observations of paralysis in the course of pertussis, and from a study of them concludes that paralyses occur most often in the course of a febrile attack with intense paroxysms. The forms are varied, resulting from lesions of the brain, cord, or of the peripheral nervous system, and the prognosis is serious, some of the cases terminating rapidly in death.

Etiology of Night Terrors.—REY (*Archiv. f. Kinderheilkunde*, Bd. xxv., Heft 3, u. iv) has found in all of thirty-two cases of night terrors that adenoid vegetations were present. After removal the terrors subsided. He therefore believes that adenoids are the most frequent cause of this disturbance, acting by the production of a carbonic-acid poisoning produced by interference with respiration.

Digitalis in Pediatric Practice.—COMBY (*Revue Internationale de Médicine et de Chirurgie*, vol. ix. No. 11) presents a concise résumé of the uses of this valuable drug in the diseases of childhood. It is indicated, he says, in cardiac disease, whether congenital or acquired, whenever the muscular contractions become of insufficient strength. It is especially valuable in mitral disease, but is contraindicated in aortic insufficiency until the pulse becomes rapid and irregular. It is useful for its diuretic action in respiratory diseases, like hydrothorax and pleurisy, and for its effect upon the heart in pneumonia, severe bonchitis, and influenza. In repeated severe hæmoptysis it slows the heart and relieves pulmonary congestion. Chronic congestion of the kidney and chronic nephritis are benefited by digitalis unless the left ventricle is

hypertrophied. In acute infectious diseases it is valuable if given before the myocardium has undergone marked degeneration. The drug is not contraindicated in acute nervous affections.

In view of its cumulative action, digitalis should never be given for a longer period than seven or eight consecutive days, and then its use must be suspended for from eight to ten days.

Three Steps in the Tuberculous Process in Children.—DAVID BOVAIRD, JR. (*New York Medical Journal*, July 1, 1899, p. 1), supplements Northrup's studies upon the subject of the primary seat of infection of tuberculosis in children, and by combining his results with those reached by the latter (*New York Medical Journal*, 1891) draws the following conclusions:

1. The primary lesions of tuberculosis in children is regularly in the bronchial lymph nodes or lungs. Combining Northrup's series with those described in the paper there is a total of 200 cases, of which 148 could be attributed to infection by the respiratory tract, 3 to infection by mesenteric lymph nodes, and 49 indeterminate.

2. As to early manifestations of tuberculosis in children, these are extremely indefinite and uncertain.

a. Tuberculous infection of the bronchial lymph nodes, as a rule, cannot be diagnosticated.

b. Latent tuberculosis is often aroused and disseminated by the invasion of another disease (infection), such as measles, diphtheria, etc., the presence of tuberculosis not being suspected.

c. The common type of tuberculosis in children is the acute miliary—it may occur in well-nourished infants.

d. The course of tuberculosis is most often confused with chronic bronchopneumonia or entero-colitis.

e. The early manifestations are progressive emaciation, fever, and the presence of râles over the lungs. These are insufficient for purposes of distinction.

3. The terminal lesions include:

a. Extension of the tuberculous process in the bronchial lymph nodes and lungs, resulting in the formation of abscesses, cavities, etc.

b. Diffusion of the tuberculous infection, constituting acute miliary tuberculosis, the principal viscera being affected in the following order: Spleen, liver, brain, kidney, and heart. The involvement of the brain is most important, the meningitis being regularly fatal.

c. When bone is involved and there is prolonged suppuration, waxy degeneration of the viscera may occur.

Comparative Value of Recent Antiseptics in Pediatric Practice.—GUSTAVUS M. BLECH (*Transactions of the American Medical Association*, June 7, 1899; *Medical Record*, July 1, 1899, p. 26) divides antiseptics of use in pediatric practice into four classes: (1) Those which act on the respiratory tract; (2) those acting on the gastro-intestinal tract; (3) those affecting the urinary apparatus; (4) those which influence the whole organism. Urotropin is decomposed by the urine and destroys the bacteria in this fluid. Guaiacol carbonate is comparatively tasteless and non-irritating, and is very useful in the treatment of chronic bronchitis. Tuberculosis, he states, could be cured

in its first stage and second stages by the antitoxic treatment, but drugs have but little curative effect in the later stages of this disease, and Murphy's nitrogen treatment has already proved a failure. Nosophen has been proved harmless; antinosin has been used in solution of 2.5 per cent. strength without producing irritation. The author has used it exclusively as a disinfectant and cleansing solution in the nasal passages. Eudoxine, the bismuth salt of nosophen, is an excellent remedy in diarrhœa, experiments having proved that by the action of the gastric juice stable salts of bismuth are formed, the nosophen passing on unaltered to the intestine.

THERAPEUTICS.

UNDER THE CHARGE OF

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Antistreptococcic Serum in the Treatment of Smallpox.—Dr. W. J. Lindsay, finding that death most often occurs about five days after the pustules have dried and have begun to be absorbed, believes it to be caused largely by reinforcement of the specific virus of variola with pyogenic toxins. Patients were chosen who from analogy might have been expected to die, all exhibiting confluence early in the pustular stage. Antistreptococcic serum was injected aseptically into the subcutaneous tissue of the abdominal wall, just before or coincident with pustulation, repeated at intervals of twelve to twenty-four hours. Digitalis with tincture of iron chloride or liquor strychnine was given four-hourly. In no instance were more than three injections given. Patients thus treated exhibited a shorter period of absorption, the intensity of the toxæmia is lessened, and the tendency to cardiac failure is diminished. Convalescence begins sooner and is rapid. Of six patients so treated none of the four recovering developed abscesses, nor was there local pain, arthritis, or hyperpyrexia.—*The British Medical Journal*, 1899, No. 2002, p. 1144.

Malta Fever Treated with Malta Fever Antitoxin.—Drs. E. D. Fitzgerald and J. H. Ewart report that after continuous treatment with calomel and phenacetin no lasting improvement resulted.

The germ of Malta fever was not detected in the blood, but the results of treatment left no doubt of the correctness of the diagnosis. Five drachms of the antitoxin were injected into the subcutaneous tissue of the abdomen, the temperature having been subnormal for five days. The following day 5 drachms were again injected, the temperature being 99°. For the next few days the temperature varied between 98° and 100° F. One week after the first injection was given a severe urticaria first appeared on the abdomen in the vicinity of the site of the injections. A febrile movement continued, and

on the expiration of the second week another 5 drachms of antitoxin were injected. The temperature rose to 104.6° F., and the patient was very ill. The urticarial rash was more pronounced, the joints were swollen and painful. There was a slight cough, and the expectoration was tinged with blood. The authors suggest an internal urticaria, causing exudation from the serous membranes involved. A few days later the patient was more comfortable; the temperature fell to normal, and he soon became convalescent. Subsequently a subnormal temperature developed, lasting for several weeks, but there was no return of other symptoms. A blood examination was made. Before the first injection of antitoxin the hæmoglobin was 120, and the corpuscles 7.3. A second examination after the second injection showed hæmoglobin 105 and corpuscles 6.93.—*The Lancet*, 1899, No. 3946, p. 1024.

Tetanus Antitoxin.—Dr. E. Tavel states that subcutaneous injection gives temporary immunity which may last from four to six weeks, and may be continued by repeated injections. This should be employed in those instances when the character of the injury or opportunity for infection suggests danger. It is useful only against tetanus infection, so that ordinary aseptic measures should not be neglected. The amount required is 2 drachms, and this may be repeated a week later. When tetanus is fully established this treatment has its limitations, and, indeed, will be successful only when the amount of toxins is not much greater than the usual fatal amount. If this is much greater and the incubation is short and severe symptoms are present, the treatment by injection will not avail because of the impossibility of injecting a sufficient quantity of the remedy. On the other hand, in intracerebral injections a smaller quantity will suffice, and the serum is rapidly brought into contact with the toxins held in the brain-substance, and can neutralize it. The necessary amount is about 1 drachm, and this may be repeated as often as is necessary. To neutralize the toxin which is circulating in the remaining portions of the body 1½ to 3 ounces of serum may be administered by intravenous injection. This is especially important if the tetanus bacilli or their toxin are still found in the wound. If intravenous injection is not practicable, subcutaneous injection in thigh, abdomen, chest, or arm may be substituted.—*Correspondenz-Blatt für Schweizer Aertze*, 1899, No. 8, S. 235.

The Therapeutic Value of Marmorek's Serum.—Dr. Wm. L. Baum draws thre following conclusions: (1) In pure streptococcic injections the serum undoubtedly exercises a favorable influence on the course of the disease. (2) In mixed infections the influence of the serum was demonstrable, but it merits further trial as an adjunct to other treatment. (3) In view of the grave character of complications of non-streptococcic nature reported, ordinary rules of therapy would demand that in such cases, as with the diphtheria antitoxin, all indicated therapeutic measures must be employed, as well as the serum. (4) As erysipelas streptococci and phagocytes often exist together in the lymph channels, it is fair to assume that the influence of the serum is directly exerted bactericidally on the streptococci and not entirely through stimulation of phagocytic action. (5) The initial dose in all cases should be 5 drachms, to be followed by one-half or two-thirds of this dose, according to the indications, every twenty-four hours.—*Medicine*, 1899, vol. v. p. 23.

Arsenic in Treatment of Accidents of Thyroid Extract Administration.—M. L. MABILLE recommends the use of arsenic to counteract rapidity of heart action following overdoses of thyroid extract. Oxidation, which is so greatly increased by thyroid extract, is also much diminished by arsenic. Animals to which thyroid extract (iodothyrin) had been given exhibited on the administration of arsenic (Fowler's solution) a marked slowing of the pulse. In animals to which only the iodothyrin was given there were seen acceleration of the pulse, excitation, and trembling, a loss of weight of more than three pounds, anorexia, and gastric disturbance. Thyroid extract furnished similar results. The author recommends simultaneous exhibition of thyroid extract and arsenic, thyroidism being either avoided or ameliorated. A goitrous patient, beginning with 3 grains of thyroid gland, was taking 10½ grains after ten days. Intolerance followed; there was violent palpitation, rapid pulse, vague pain, and trembling. Beginning with two drops of Fowler's solution the dose was increased to twelve drops, and then thyroid administration was again commenced, as much as 12 grains being given. The symptoms of thyroidism disappeared. Medication was continued, with success, and no emaciation followed. The addition of arsenical preparations in relatively large doses permits the toleration of thyroid extract, often borne so badly when given alone.—*Les Nouveaux Remèdies*, 1899, No. 9, p. 195.

Gelsemium Sempervirens.—DR. N. P. BARNES maintains that this drug should receive more attention because of its great therapeutic value. One-fifth of 1 per cent. is the average amount of alkaloid in the severed root, and constitutional effects are regularly obtained from the standard fluid extract. Gelseminine, the alkaloid, is a non-crystallizable dry mass, white, alkaline, insoluble in water, but soluble in alcohol, ether, and chloroform. There are several unofficial preparations, but the official fluid extract and tincture are very satisfactory. The drug is antispasmodic, antipyretic, antineuralgic, antimalarial, analgesic, hypnotic, and diaphoretic. Through its direct action on the spinal cord, dulling and paralyzing mobility and sensibility, it is a nervous sedative and depressant. The third, fourth, fifth, and sixth cranial nerves and those supplying the genito-urinary organs are especially affected. Reflex excitability is first increased and then diminished, and finally exhausted. Small doses, one-half to one minim of the fluid extract, relax the general nervous system, relieve nervous irritation and muscular tension. Large doses, one to five minims, cause languor, enfeeble muscular action, impair sensibility, dilate the pupils, cause ptosis, and excite diaphoresis. Effects of a moderate dose disappear in three hours. Toxic doses (ten minims or more) produce vertigo, diplopia, ptosis, mydriasis, prostration and muscular relaxation, partial paralysis of sphincters, respiration, and, lastly, heart failure. Antagonists are small doses of opium, or morphine and atropine. Six to eight hours elapse before a toxic dose is fatal. It is indicated in conditions of exalted nerve function, mental excitation, and muscular tension. Early in fevers it is antipyretic and sedative. As a succedaneum to quinine in malaria it is of value, relieving the unpleasant effects of the former. The head symptoms in a commencing "cold" are dissipated in a few hours. In grippe, gelsemium controls the fever, headache, pains, and restlessness. Pain of a neuralgic or rheumatic character is relieved by this

drug where there is arterial excitement or local congestion. In tic douloureux it is almost specific. Coccygodynia is often cured, and in sciatica gelsemium is useful, but not curative. Ovarian neuralgia and uterine colic (?) are efficiently treated with it. Headaches, neuralgic, congestive or periodic, are promptly relieved. With sodium bromide gelsemium is a most efficient hypnotic. Muscular spasms, such as epileptic and hysterical convulsions, are relieved. To prevent erections and chordee in gonorrhœa, gelsemium is invaluable. In catarrhal cystitis, irritable bladder, and incontinence of urine from spasm of muscular fibres gelsemium is excellent.—*Maryland Medical Journal*, vol. xli. p. 288.

Treatment of Diphtheritic Paralysis.—Dr. Francis Hoben insists upon absolute rest in a well-ventilated room, good food, good air, tonics, and particularly iron in a digestible form. Strychnine should be given in full doses by the mouth, or, in severe cases, hypodermatically. Recently the nitrate in one-fiftieth of a grain dose was given subcutaneously twice daily for two weeks, and subsequently once a day for some weeks longer, with excellent results, to a child two and one-half years old. The subcutaneous method should be chosen if the constrictors of the pharynx are involved, if the heart or respiration show the toxic effects of the poison, or if the muscular incompetency is pronounced. Careful massage of the extremities will improve the cutaneous circulation and the condition of the muscles. If respiration is endangered, electricity, used with judgment and intelligence, must be employed in addition to artificial respiration and rhythmical traction of the tongue.—*Pediatrics*, 1899, No. 11, p. 50.

The Treatment of Some Climacteric Neuroses.—Mr. W. J. Handfield Haslett regards a change of scene and environment as the first principle of treatment, but not travel. The patient should be much in the open air, but short of physical exhaustion. For insomnia try the open-air treatment or the warm bath at night. If persistent sleeplessness demand drugs, use paraldehyde, commencing with one-half and increasing to three drachms if necessary. The nutrition of the patient must be maintained. On examination the tongue will be found to be flabby and thickly coated; there will be acid eructations and perhaps vomiting. This condition is due to defective innervation of the alimentary tract, and the patient needs ten eggs a day, with two quarts of good milk, a quart of strong vegetable soup, with perhaps a little brandy if the heart be weak, and an occasional dose of Epsom salts, and in a week or two the tongue will be perfectly clean, and the patient gains in weight. Of tonics, nux vomica and iron ammonio-citrate are the best. If the patient is maniacal, iron is strongly contraindicated. If the symptoms of malnutrition are prominent, massage and the Weir Mitchell treatment are useful, and if there is much stupor faradic electricity often does much good. If the patient is restless and agitated by day, and especially when the skin is dry and harsh and the pulse hard, nepenthe is by far the best sedative.—*Treatment*, 1899, No. 7, p. 208.

Treatment of Headaches.—Dr. R. E. Peck lays stress on the importance of recognizing that headache is usually a symptom, and that it is necessary

to seek for its cause in order to effect a permanent cure. He discusses the various forms of headaches and the conditions to which they point, such as syphilis, brain tumor, malaria, and concludes by discussing hydriatic procedures for the relief of headache due to neurasthenia. Water (50° to 75° F.) is to be thrown on the chest, back, and abdomen from the hand of an attendant. Better results are obtained in hydriatic institutions by the use of the ordinary douche, the temperature of the water being 50° to 80° F. under a pressure of ten to twenty pounds to the square inch. As the pressure is increased the temperature is to be diminished at each sitting until the limit of the reactive power of the patient is reached. The needle spray is then to be used. Before beginning with the douche three to five minutes should be spent in a hot-air box (temperature not indicated) to dilate the arteries, and afterward a brisk twenty-minutes' walk is taken in the open air. The author advocates Dr. Herter's method of treating migrainous headache by lavage, whether the stomach contains food or not. The temperature of the water should not be less than 105° F. Pain is thus relieved, and if done early an attack may be aborted. The drinking of hot water may be substituted for lavage where the latter is impracticable. Following lavage a rapidly acting cathartic is given. The *rationale* of the treatment is that there is some underlying disease of the nervous system in patients subject to migraine, predisposing to the irritating effects of certain poisons, especially those produced in the alimentary canal by the action of bacteria and by the imperfect digestion of the proteids. These toxins are largely eliminated by lavage and cathartics.—*Yale Medical Journal*, 1899, vol. v. p. 372.

Gold in the Treatment of Anæmia and Malnutrition —Dr. J. P. Sheridan rather deprecates the use of iron and "various æsthetic elixirs" as convenient placebos, and recommends in anæmia and malnutrition "a tonic alterative and proper food." He recommends the liquor of gold, arsenic, and mercury bromides. It is tasteless and can be given in milk, and is especially indicated when the above conditions occur in childhood. The secondary anæmia of syphilis following treatment with the usual mercurial preparations can be very successfully treated by it. In too frequent menstruation, and in apparently a variety of diseases of women, a preparation of gold and arsenic—composition not being given—is greatly lauded.—*The New York Medical Journal*, 1899, vol. lxix. p. 634.

Aspidium Spinulosum.—Dr. Walter Lauréu recommends an ethereal extract made from the rhizome of this plant as an efficacious remedy, in dose of one drachm, for tapeworm. In an instance reported, two hours after administration castor-oil was exhibited, and one and one-half hours thereafter the head and twenty-five feet of a bothriocephalus latus was expelled. Success followed its use in other instances. The substitution of this for the official aspidium is recommended when the plant is more plentiful.—*Therapeutische Monatshefte*, 1899, Heft 4, S. 211.

[Attention has been called to the value of other aspidia in the hope that an explanation may be found for the occurrence of poisoning from the use of the official aspidium. It has been suggested that its toxicity varies with the country of its growth. By using the indigenous aspidium this danger

may be avoided. It is a curious fact that in most fatal cases castor-oil has been used. It would be well to substitute some other cathartic.—R. W. W.]

OBSTETRICS.

UNDER THE CHARGE OF

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The Weight of the Fœtus and of the Placenta in Cases of Maternal Albuminuria.—WIPPERMANN (*Archiv für Gynäkologie*, 1899, Band lvii. Heft 3) tabulates thirty-four cases of nephritis during pregnancy and of albuminuria during pregnancy, and has studied the effects of these conditions upon the fœtus and the size of the placenta.

Eleven of these cases had chronic nephritis, and none of them went to the normal termination of pregnancy. Two of the eleven died in the ninth month. Twenty-three patients had acute nephritis of pregnancy, and of these three died shortly after delivery. As regards the placenta, it is interesting to note that in chronic nephritis infarcts are present in the placenta in 90 per cent. of cases. In the acute nephritis of pregnancy infarcts are present in 65 per cent. and absent in 35 per cent.

His investigations show that chronic nephritis profoundly influences the placenta and brings on labor before the natural end of pregnancy. The development of the entire ovum is greatly affected, and many of these children perish.

Albuminuria lessens the development of the fœtus and makes its weight less in proportion to that of the placenta.

It is interesting to compare albuminuria and syphilis, as both conditions result at times in fœtal death, and both influence the development of the fœtus. In each of these conditions the placenta is relatively larger than normally; in the case of albuminuria because the child is less well developed, while in syphilis the increased weight of the placenta results from the deposit of foreign material in its tissue.

Phloridzin-Diabetes in Mother and Child, and its Relation to the Question of the Secretion of Urine by the Fœtus.—In the *Archiv für Gynäkologie*, 1899, Band lvii. Heft 3, SCHALLER contributes a very interesting paper upon this subject, in which he narrates experiments by the administration of phloridzin in pregnant women and the examination of the urine of mother and child during and after labor. His studies lead him to conclude that we have no evidence that the fœtus secretes urine regularly and discharges it periodically into the amniotic liquid during pregnancy. The kidney secre-

tion of the fœtus normally begins during labor, under the influence of increased pressure in the placental circulation caused by uterine contractions. In the greater number of cases the fœtal bladder is not emptied during birth into the amniotic liquid. It is only in very rare cases that the fœtus will discharge urine into the amniotic liquid, and this occurs when the placental circulation is interfered with by birth-pressure during prolonged labor. The amniotic liquid is not derived from the fœtus, but is a transudate from the maternal bloodvessels.

The kidneys of the new-born child act much more slowly than those of the adult, and a regular performance of their function is not established until some time after birth.

[These very interesting observations throw light upon the very gradual secretion of urine by new-born children. Cases are repeatedly brought to the attention of physicians by careful nurses in which no positive evidence that an infant has secreted urine can be obtained for several hours after birth. Many of these children suffer no inconvenience from the late assumption of the urinary function. If the child be kept warm and its circulation maintained, and it be given water freely, there occurs a discharge of highly colored urine, often rich in uric acid, and the gradual formation of the usual secretion.]

Slowing of the Pulse During the Puerperal State.—VARNIER (*Annales de Gynécologie et d'Obstétrique*, January, 1899) has conducted a series of observations to determine the presence of slowing of the pulse, which has been commonly thought to occur after labor.

In thirty-two pregnant women in whom the pulse was taken during the last two months, it was found to be above 75, and only occasionally below this average in twenty-six, or 81 per cent. Four of these patients had a pulse which averaged 75, and in two of them the pulse was distinctly below this average. A second series of eighteen patients was examined who had been confined, and in whom the pulse was taken in the morning only, while in seventeen others it was taken morning and evening. The duration of these observations was from nine to sixteen days. It was found that of these thirty-five puerperal women but one had a pulse above 75. Twenty had pulses averaging 75 and fourteen below 75. In most of these women the average pulse-rate was as low as 70.

It was found that slowing of the pulse occurs more frequently among the multiparæ than primiparæ. The lowest rate observed was 40, and the highest in multiparæ 68. From the fifth to the eighth day the pulse was usually slowest, then on the seventh day, and occasionally the diminution in the pulse did not occur until the tenth day. A rapid increase in the pulse-beat was usually observed when the patient first left her bed.

Unusual Forms of Puerperal Hemorrhage.—MARX (*Medical News*, March 4, 1899) reports several cases of unusual puerperal hemorrhage.

In one at five months premature labor occurred, followed by the interrupted expulsion of three fœtuses. The last was expelled five weeks after the first. Until expulsion was complete the patient had slight intermittent hemorrhage. In another case a physician mistook a greatly distended blad-

der for the relaxed uterus, and practised massage vigorously. There was continued bloody lochia, and when the bladder was emptied by catheter the urine was also bloody. The patient was promptly relieved when the bladder was emptied. In a third patient when convalescent a very distended bladder caused severe hemorrhage, from which the patient very slowly recovered. A multipara had involution of the uterus and prolonged bloody lochia. Seventeen days after labor, during the action of the bowels, the patient was seized with intense pain in the abdomen. This was followed by hemorrhage. An organized placental polyp, attached by a long pedicle to the fundus, had partly inverted the uterus. The growth was removed and the womb replaced.

A scorbutic primipara was easily delivered with forceps. Hemorrhage occurred into the vulva, extending around the rectum into the broad ligament. The hæmatoma was incised, irrigated, and packed with gauze. The patient afterward died of tubercle. Fatal hemorrhage occurred in a multipara who seemed to be a bleeder. All efforts to check the hemorrhage, which oozed from the entire genital tract, were unavailing.

Secondary hemorrhage from a torn cervix proved fatal in a multipara who bore a child in breech presentation. The bleeding was controlled at labor by gauze packing. When, however, the gauze was removed on the third day the patient died from hemorrhage.

[These cases resolve themselves into three classes. Those in which profound affection of the blood is present can rarely be controlled. A distended bladder should be diagnosticated and promptly relieved. Hemorrhage from the lacerated cervix should be treated in but one way only, and that by suture. The writer urges that an enlarged womb and bloody lochia should excite the suspicion of the physician and demand attention. In this he is certainly right.]

Three Cases of Labor in Double Uterus.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1899, Band xl., Heft 2, WAGNER reports three cases of labor in double uterus. The first was that of a multipara who had previously had an abortion. On admission to the hospital the patient was seven months pregnant, and the child was about to be born. It was spontaneously expelled, but the placenta was retained. Five hours after birth, having failed to express the placenta, the patient was anæsthetized and the placenta manually removed. The womb was found divided by a septum, the placenta being in the right half. It was attached to the fundus and also to the septum. The wall of the womb was very thin where the placenta had been attached, but thick in other portions. The patient made a good recovery.

His second case was also a multipara, who had a transverse presentation. Version was done without especial difficulty and the child easily extracted. Immediately afterward the womb assumed the characteristic two-horned shape. A septum was found dividing it into two portions. It was necessary to remove the placenta manually. The half of the womb which had not contained the fœtus was tightly contracted and lined by decidua. This patient had thrombosis of a vein dating back to a previous typhoid. She made, however, ultimately a good recovery.

Case third was a primipara, whose child was in breech presentation. Heart sounds could not be heard, and the mother had ceased to feel move-

ments. The uterus assumed the characteristic two-horned shape. On examination both vagina and uterus were found double, divided by a septum. The vaginal septum was incised with scissors and the child delivered still-born. Post-partum bleeding occurred, and it was necessary to remove the placenta. This patient recovered after passing through a mild septic infection.

On reference to the literature of the subject it was found that pregnancy rarely proceeds to full term in these cases. Patients who have this abnormality have normal pelves and give no external evidence of it. During pregnancy these patients are not exposed to the dangers of hemorrhage. A decidua forms in the empty half of the womb.

Labor is influenced but very little by the presence of the septum, and the half of the womb which contains the child contracts normally. When, however, the child is expelled the womb fails to remove the placenta, and manual interference is necessary. In ordinary cases the placenta must be removed by the hand in but $\frac{6}{10}$ of 1 per cent., while in patients having this abnormality such interference is usually necessary. If the septum in the vagina and uterus be divided and the tissues packed with gauze, a good result follows, and these patients may afterward go to full term and be normally delivered.

Hemorrhages in the Early Months of Pregnancy.—In a clinical lecture at the Glasgow Maternity Hospital, JARDINE (*Scottish Medical and Surgical Journal*, March, 1899) called attention to cases of supposed menstruation during pregnancy in which the hemorrhage occurs from the unimpregnated half of a double uterus. Bleeding in early pregnancy may also come from a diseased cervix. He described two cases of women, pregnant about the seventh month, who had sustained wounds of the labia, which bled excessively. It was necessary to suture these wounds, to tampon the vagina and vulva with gauze, to make pressure by a large vulvar pad and "T" bandage and apply cold. He also called attention to early ectopic gestation as a cause of hemorrhage, and reported a case in which a patient expelled a cast of the uterus, which on examination showed neither decidual cells nor chorionic villi. It was evident that pregnancy had not been present. In cases of hemorrhage and cramp-like pain he considered the microscopical examination of the lining membrane of the womb to be of the greatest importance.

The Placenta in Triple Pregnancy.—In the *American Journal of Obstetrics*, March, 1899, DRENNAN reports a case of triplets and describes the placentæ. The cords of the last two fœtuses delivered were attached to a small placenta, which must have been separated from the uterine wall for some time. It was shrivelled, and the two cords were thin and collapsed. The first fœtus had a good-sized and healthy placenta, which was delivered manually from the uterus.

[We recently had occasion to observe the appendages in a case of triplets. There were two fairly formed placentæ, the third being much smaller and apparently developed in the membrane of the other two. The cord of the third fœtus ran along the membrane for a considerable extent. In Drennan's case the first fœtus was well developed, and labor came on at about five

months. In the case to which we allude the pregnancy ended much later, and two of the children lived for some time. The fœtus attached to the smallest placenta died soon after birth.—ED.]

GYNECOLOGY.

UNDER THE CHARGE OF

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Vaginal Hysterectomy with Doyen's Clamp.—THUMIN (*Centralblatt für Gynäkologie*, 1899, No. 5) reports thirty-one successful operations in which the broad ligaments were temporarily compressed with an instrument devised by him on the principle of the angiotribe of Doyen and Tuffier. All the operations were bloodless, and the convalescence was uncomplicated. The effect of the great pressure maintained for two minutes before removal of the clamp, as shown by microscopical examination, is to cause obliteration of the arteries by adhesion of the opposed endothelial surfaces, while the proximal and distal ends are plugged by thrombi—in short, the tissues are mummified but not necrosed.

Resection of Diseased Ovaries.—GERSUNG (*Ibid.*) advises that in cases of small ovarian cysts an attempt should be made to save a small portion of healthy stroma. He has made it a practice to enucleate from the ovary small cystomata, even dermoids, in cases in which a large tumor was present on the opposite side. Normal menstruation persisted, and in two instances pregnancy occurred.

Under no circumstances should an ovary be spared when the opposite one is the seat of carcinoma, papillary cystoma, or superficial papilloma, even when the organ is apparently perfectly healthy, since in most instances foci of disease will be found on microscopical examination. We are not yet in a position to affirm under what conditions small, benign tumors of the ovary impair the function of the healthy portion of the organ or to predict the possible dangers of a conservative operation in a given case.

Enucleation of Uterine Fibroid.—LÉMOIN (*Deutsche med. Wochenschrift*, 1898, No. 26) reports ninety-seven cases, with six deaths. The ages of the patients varied from twenty-six to sixty-seven years, the indications for operation being profuse hemorrhage or rapid growth of the tumor and deterioration of health. The author's technique is briefly as follows: After delivering the tumor through the abdominal wall each broad ligament is grasped in turn with forceps, divided, and then ligated. An incision is then made over the neoplasm, which is enucleated, and the cavity is closed with deep catgut sutures, the peritoneal flaps being sutured over the uterine wound, and the uterus is returned to the cavity, which is closed without drainage.

In the case of small tumors the vessels are not ligated, but the broad ligaments are clamped temporarily with forceps, the ends of which are guarded with rubber tubing.

All the patients who recovered remained in good health, six menstruated regularly, and one became pregnant and was delivered at full term.

Tumors Developing from Gartner's Ducts.—KLEIN (*Virchow's Archiv*, Band cliv., Heft 1) reviews this subject at length, stating, as the result of his own studies, that the ducts begin in the parovarium, run in a curved direction through the broad ligament on either side to the uterus, penetrating the muscular wall of the organ to the os internum. In the portio they turn upward over the vaginal fornix and extend down the sides of the vagina to the hymen. The distal portions of the ducts may form glands and outgrowths (sprossen), analogous to the seminal vesicles in the male, while the paraurethral ducts correspond to the prostatic glands.

The persistence of Gärtner's ducts in the female is pathological, and from them may be developed both epithelial and fibro-muscular neoplasms, although this has not been positively demonstrated with regard to sarcoma and carcinoma.

Cysts of the ducts within the broad ligament can only be distinguished from parovarian cysts in their early stages. They may be papillomatous. In the muscular wall of the uterus, cysts, cystic adenoma, adenomyoma, and fibro-cysts may spring from the persistent ducts; pure adenoma, as well as adeno-carcinoma, has not been proved to have this origin. Vaginal cysts and adenomyoma develop in this way, also simple cysts of the hymen.

Malignant Adenoma of the Uterus.—KAUFMANN (*Ibid.*), from microscopical studies of a cancerous cervix removed five years after supravaginal amputation of a fibroid uterus, arrives at the conclusion that malignant adenoma, especially of the cervix, represents a distinct variety of cylindrical carcinoma, with a tendency to the formation of more or less perfect glands. The malignant character of the growth is shown by the polymorphism of the gland epithelium as well as the disposition to the formation of numerous layers.

So-called inoculation—metastasis in the vagina—usually represents direct extension of the disease. True metastasis by way of lymph-vessels or blood-vessels is more probable than the development of separate foci by inoculation. It cannot be denied, however, that raw surfaces may be inoculated during operation.

Restoration of the Urethra by Gersung's Method.—ROMM (*Centralblatt für Gynäkologie*, 1899, No. 8) reports the following case: As the result of a severe labor the urethra was entirely destroyed with the exception of the anterior wall, the opening into the bladder being buried in cicatricial tissue. The urethra was restored by a flap-operation, but incontinence persisted. The operation was repeated, and the canal thus formed was subsequently twisted around its long axis 180° from left to right, and fixed by sutures in its new position, a silver catheter with a similar twist being inserted in the bladder. At the end of two weeks the patient could retain her water for

three or four hours at a time. A month after this operation the new-formed urethra was dissected out as far as the bladder and again twisted 180°, being sutured in such a way that the external opening was situated near the clitoris. A month later the patient had entire control of her bladder, both while lying and standing.

Primary Cancer of the Uterus.—D'ERCHIA (*Zeitschrift für Geb. und Gyn.*, Band xxxviii. Heft 3) calls attention to certain tissue changes in the uterus and adnexa in connection with cancer. Hypertrophy and hyperplasia of the uterine mucous membrane and connective tissue were frequently noted, and occasionally sarcomatous degeneration of the connective tissue of the cervix.

Extensive hyalin degeneration of the stroma and vessel-walls of the ovaries were common, and in one instance a small, metastatic nodule was found in the middle third of one tube. The practical deduction made by the writer was that the adnexa should always be extirpated with the uterus even in the early stages of cancer of the uterus.

Appendicitis and Salpingitis.—RONTIER (*Annales de Gynécologie et d'Obstétrique*, 1898, No. 12), in reporting a series of cases, emphasizes the difficulty in diagnosis between these two conditions, since there are no pathognomonic symptoms. When the two coexist it is not easy to determine whether the inflammatory process began in the appendix or in the tube. Since unilateral disease of the tube is rare, however, it is safe to infer that a tumor upon the right side is appendiceal. Moreover, when during the course of a cœliotomy the right tube alone is found to be diseased, the appendix should always be examined and removed if it presents a suspicious appearance.

Hernia of the Fallopian Tubes.—WIART (*Annales de Gynécologie et d'Obstétrique*, 1898, No. 12) reports a case of double congenital hernia of the tubes, found in the dissecting-room, in which there was no external tumor. The hernial sacs contained the distal end of the left tube and nearly all of the right, without the ovaries, thus supporting the theory of Cruveilhier that the hernia of the tube always precedes that of the ovary.

In the case reported the subject was an infant, aged two and one-half months, showing that the condition was undoubtedly congenital, while the hernia was inguinal rather than crural, contrary to the ordinary rule.

Fibroma of the Ovary.—LEVITZKY (*Ibid.*) reports two cases of pure ovarian fibroma. In one the tumor, weighing less than two pounds, had existed for eighteen years, but caused no symptoms until the patient had reached the age of forty-one. In the other, which weighed two and one-half pounds, the growths were first observed two years before operation. There was no ascites in either instance.

In spite of the benign character of ovarian fibroma, the writer urges the necessity of surgical intervention, on account of the tendency to sarcomatous degeneration.

Peritoneal Resorption.—NOETZEL (*Archiv für klin. Chirurgie*, Band lvii. Heft 2) concludes that the true significance of peritoneal absorption is the

removal of part of the bacteria which are present. The peritoneal fluid is the principal agent in accomplishing this result, aided by the peristaltic movements of the intestines. Its bactericidal power is greater than that of any of the other serous fluids (Gewbssäfte). On the other hand, the peritoneum is exceedingly sensitive to irritation, whether mechanical, chemical, or thermic, and in consequence loses its peculiar power of disposing of bacteria. Toxins in particular inhibit its germicidal action. The practical deductions are the importance of avoiding septic infection and mechanical injury to the peritoneum during operation and the withholding of opium in order to favor peristalsis.

Cancer of the Cervix Uteri Following Supravaginal Amputation.—SAVOR (*Centralblatt für Gynäkologie*, 1898, No. 50) reports the following case: A woman, aged fifty-two years, had been operated upon four years before for fibromyoma of the uterus, the cervical stump being treated in the usual manner. Convalescence was protracted on account of the formation of a fistula communicating with the cervix. The patient applied for treatment on account of hemorrhages and a watery discharge. On examination the posterior lip of the cervix was found to be the seat of cancer, which had extended to the vaginal vault. It was extirpated with great difficulty, owing to the firm adhesion of the bladder and the atrophy of Douglas' pouch. The cervical mucous membrane presented a normal appearance, but the canal was obliterated for a distance of half an inch below the seat of amputation.

The writer refers to three other cases in Chrobak's clinic in which the cervical stump subsequently became cancerous; also to a fifth unreported case, and regards this as a strong argument in favor of pan-hysterectomy.

DERMATOLOGY.

UNDER THE CHARGE OF

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The Treatment of Lupus Erythematosus.—HEBRA (*Archiv f. Dermatologie und Syphilis*, Bd. xlviii., Heft 1), at the session of January 25, 1899, of the Dermatological Society of Vienna, presented two patients with erythematous lupus who had been treated with alcohol, and in both there had been a distinct retrogression of the disease. Where the disease was slight, as upon the ear and the cheek, it had completely disappeared; at the inner canthus, which was less accessible to treatment, the retrogression was less marked.

EHLERS (*Dermatologische Zeitschrift*, Bd. vi., Heft 2) presented two patients before the Danish Dermatological Society who had been treated with mercury in the form of Robin's pills, with favorable results. The composition of these pills is as follows:

℞.—Hydrarg. chlorid. corrosiv	1 grm.
Sodii chlorid	1 "
Vini thebaici	1 "
Micæ panis	5 grms.
Glutenis	2.5 "
Glycerini	2.3 "
M.—Ft. pil. 100.	

One to two pills are given daily, at meal time, and notwithstanding the large dose of corrosive sublimate which they contain they are well borne. The effect upon the lupus is a remarkable one—redness, itching, and swelling of the eruption occurring very much as after an injection of tuberculin. After a couple of days the redness disappears, with abundant desquamation, and the disease begins to retrograde.

Eczema Treated by Röntgen Rays.—MACKEY (*British Journal of Dermatology*, April, 1899), at a meeting of the Dermatological Society of London, read notes of two cases of eczema treated by the Röntgen ray. The first case was a boy, aged eleven years, who had been repeatedly treated in the usual manner without marked benefit, the parts affected being the legs, arms, and cheeks. After treatment with lotions and salves for nearly a month, without improvement, the X-rays were used for ten minutes daily, at four inches distance. After a month of this treatment marked improvement was noted, the case being almost cured. The second case was a girl, aged thirteen years, who had had an eczema continuously for two years, the parts affected being the bends of the elbows and the region about the mouth. After sixteen applications of the X-rays, made as in the first case, the right arm was practically well, but the left one was still eczematous. It is important that the treatment be suspended if signs of irritation appeared.

The Treatment of Sclerodermia by Thiosinamin.—HEBRA (*Archiv f. Dermatologie und Syphilis*, Bd. xlviii., Heft 1), at a meeting of the Dermatological Society of Vienna, presented three cases of sclerodermia which had been treated by hypodermatic injections of thiosinamin. The first patient had received twenty-four injectons, and the skin, which in the beginning was tense and shining, had become approximately normal. In the second patient, after twenty-four injectons, the hard circumscribed area diminished in extent and resistance. In the third patient improvement was manifest after the fourth injection. Half a Pravaz syringeful of a 15 per cent. alcoholic solution was injected every second day in the interscapular region, the injections being made deeply, in order to avoid the production of superficial necrosis of the corium

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Liomyoma Cutis.—C. J. WHITE (*Journal of Cutaneous and Genito-urinary Diseases*, June, 1899) reports a new case of this very rare affection. The patient was a man aged forty-five years, of American birth, who had always been in good health. The first tumor appeared upon the side of the lower

jaw; after some months this was followed by others, until there were over sixty scattered over the right cheek and upper part of the side of the neck. The tumors varied in size from a pin's head to a large pea, the smallest being pinkish-red in color, the largest almost white, with a shining, flat, translucent surface. They were of firm consistency and non-compressible. The patient at times experienced great pain, sometimes coming on spontaneously, but always after the lesions had been subjected to pressure or when the face had been exposed to cold Microscopical examination of the tumors revealed a new growth of muscular tissue which had replaced almost entirely the normal corium. There was also a hyperplasia of bloodvessels and secondary degeneration.

Acute Circumscribed Œdema Associated with Hæmoglobinuria.—WENDE (*Journal of Cutaneous and Genito-urinary Diseases*, April, 1899) reports the following case: A man aged sixty-four years, in excellent general health, and of robust physique, suddenly experienced a feeling of tension in the skin of the dorsum of the right hand, which became markedly swollen, the swelling being firm and elastic, not pitting on pressure, and unattended by any change in the color of the skin. After twenty-four hours the swelling had subsided somewhat, but ten days were required for its complete disappearance, a recurrence accompanied by small swellings on the forearm and in the face having taken place during this period. The urine, which apparently contained blood, was found to be free from blood-corpuscles, but contained hæmoglobin. The day following the attack the blood appeared to exhibit a diminution in hæmoglobin, and a count of the red corpuscles showed a great decrease in number, there being only 3,520,000.

Lichen Annularis.—GALLOWAY (*British Journal of Dermatology*, June, 1899) reports an unusual form of ringed eruption occurring upon the extremities. The patient was an anæmic boy, aged ten years. Upon the hands, in the neighborhood of the joints, were several circinate patches with pale, ivory-like, elevated borders, the area of skin the centre of the patches being to all appearances normal, although it had previously been affected in a manner similar to the border. These lesions began as papules in the centre of the area affected, advancing by peripheral increase, always presenting a peculiar induration. They were distributed chiefly on the dorsal and lateral aspects of the joints of the hands. Microscopical examination of the lesions showed that they consisted chiefly of an infiltration of new cells into the cutis of the type seen in certain chronic inflammatory processes. The local use of salicylic acid, in a 2 per cent. to 10 per cent. ointment, and the internal administration of iron and cod-liver oil, were followed by the almost complete disappearance of the eruption.

The author concludes from a study of this case, and others resembling it, that there are certain chronic inflammatory conditions of the skin which produce lesions resembling lichen planus, due to poisonous substances of unknown nature in the circulation. In some instances gout and rheumatism may be the causes which produce this cutaneous affection.

PATHOLOGY AND BACTERIOLOGY.

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A Study of the Spinal Cord by Nissl's Method in Typhoid Fever, and in Experimental Infection with the Typhoid Bacillus.—NICHOLS (*Journal of Experimental Medicine*, March, 1899) says the changes in the motor-cells of the ventral horn and in the nerve-cells of the dorsal-root ganglia were studied in three cases of typhoid fever in man and in seven cases of experimental typhoid infection in rabbits.

Of the three cases in man all were severe infections. One died on the eleventh and one on the tenth day with perforation, and the third after an indefinite illness of about two months. In two cases the autopsy was made six hours after death, and in the third, fourteen hours, the bodies having been kept on ice. In all cases the typhoid bacillus was obtained in cultures made at autopsy.

In the ventral horn the cell changes were numerous, the most marked changes being in the lumbar region. The changes were an increase in size both of the cells and of the dendrites, a breaking apart and partial or complete solution of the chromatic substance (Nissl's granules), advancing from the region of the nucleus outward to the periphery of the cell, the granules being partly destroyed and diffused in the fluid of the cell, so as to form when precipitated a pale, blurred flocculent-looking mass. In some cases where this chromatolysis was most marked the nucleus had migrated to the opposite side of the cell. In these cells also the slightly enlarged dendrites were almost free from chromatic substance. Changes in the achromatic substance were slight.

The changes were most marked in the case of two months' duration.

[In view of the great variety of conditions which are said to cause alterations in Nissl's granules, it is surprising that the writer should unreservedly consider the changes in the cord of this case to be due to typhoid fever. The patient, a man aged sixty-seven years, with an indefinite history of two months' illness, died two days after entering the hospital. The clinical diagnosis was senile pneumonia. At the autopsy there was found a recent thrombus in the branch of the pulmonary artery supplying the lower lobe of the right lung, and solidification of this lobe, with gangrene and perforation of the visceral pleura, and resulting pyopneumothorax. The spleen was large and soft, but there were no intestinal lesions. Cultures from the solidified area in the lung, from the spleen, and other organs revealed the typhoid bacillus. The case is considered one of general infection with the typhoid bacillus without intestinal lesions. The influence of the chemical products resulting from the suppuration and necrosis in the lung the writer appears

to have entirely overlooked. Although cultures from the lung showed only the typhoid bacillus, in the report elsewhere (Flexner and Harris, *Johns Hopkins Hospital Bulletin*, December, 1897, No. 81) of the case as an example of typhoid fever without intestinal lesions, the statement is made that "cover-slip preparations from the gangrenous lung and the pleural exudate showed bacillary forms of several kinds, including large coarse individuals not unlike certain putrefactive bacteria." That the marked changes in the cord of this case were due to the products of the putrefactive process in the lung as much as to the products of typhoid bacillus seems very probable.]

In the dorsal root the changes here were slight. They consisted in rarefaction of chromatin and changes in the shape and position of the nucleus.

In the experimental work seven rabbits were inoculated in the ear vein with bouillon cultures of the typhoid bacillus. The changes found were similar to those in man, being slight after two hours, marked after seven hours, and very extensive after thirty-three hours. In a rabbit killed after fifty-two hours there were practically no normal cells. The central form of chromatolysis was very prominent. Two rabbits which were partially paralyzed, and were apparently beginning to recover, were killed on the twenty-third and sixty-fourth days. In these it was thought that a process of restitution, as shown by a properly staining nucleus, and a typical arrangement of apparently newly-formed Nissl's granules was taking place.

In the prolonged cases a degeneration of the peripheral nerves (sciatic and its branches) was observed.

The writer concludes that the motor-cells of the ventral horn and the cells of the posterior root ganglia regularly undergo pathological changes in typhoid fever, and that changes in the peripheral nerves are common; and these changes are due to post-typhoid hyperæsthesias and paralysis.

The Bacteriology of the Accessory Sinuses of the Nose in Diphtheria and Scarlet Fever.—R. M. PEARCE (*Journal of the Boston Society of the Medical Sciences*, March, 1899) says, with the exception of Wolff, who in 1895 published the results of his examinations of the accessory sinuses of the nose in diphtheria, little attention has been paid to inflammatory conditions of these cavities as the result of the acute infectious diseases of children.

This is probably due to the small number of post-mortem examinations in this class of cases, and also to the difficulty of reaching the cavities. They can only be reached by sawing through the base of the skull (after removing the brain) and forcibly separating its two halves.

Pearce has carried out this method in fifty cases of diphtheria and scarlet fever examined post-mortem at the Boston City Hospital.

Thirty-nine of these were cases of diphtheria only, four were cases of scarlet fever only, and in the others the two diseases were coincident.

Of the entire 50 cases, inflammatory changes were found in 33. As would be expected, the antrum of Highmore was most frequently affected, the condition being bilateral in 23 and unilateral in 7. The sphenoidal sinuses were involved in 6 cases and the ethmoidal sinuses in 2. In most cases the exudate was purulent or seropurulent, but in a few was merely mucoid in character. The cases were almost exclusively among children, and the sinus disease was not suspected during life.

Bacteriological examinations were made in all cases. The diphtheria bacillus occurred in most cases, generally associated with the streptococcus pyogenes, the diplococcus lanceolatus, or the staphylococci.

Suppuration of the middle ear was very common in these cases, being present on both sides in twelve cases and on one side only in six. The bacteriological examination of the ear yielded results very similar to those obtained in the examination of the sinuses.

The writer believes an infection of the antrum of Highmore, with diphtheria bacillus, to be the explanation of the persistence of the bacillus in cultures from the nose after all membrane has disappeared. The antrum drains slowly, and if once infected with diphtheria bacilli, cultures from the nose would be positive until drainage had ceased or the bacilli had died out.

That these acute processes may lead to chronic sinus disease the writer considers very probable.

HYGIENE AND PUBLIC HEALTH.

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Poisoning by Meats.—Dr. Y. Boyer (*Lyon Médical*, May 14, 1899) records a case of sextuple poisoning from eating veal. The persons affected were members of one household, and ranged widely in point of age, the youngest being children of three and six years. The symptoms appeared in the night, about six hours after the food was taken, and began with vomiting and violent colic. In the morning all had intense gastric irritability, coated tongue, pain on pressure, especially in the right iliac fossa, rumbling, slight tympanites, and scanty urine. The cook had markedly dilated pupils, sensation of suffocation, constriction and dryness of the throat, and intense suffusion of the face. The child of six years had dilated pupils and disturbance of vision, and finally pain and stiffness of the muscles of the neck. The younger of the two children and the mother were less affected than the others, and made a more rapid recovery. The chambermaid had at first a certain degree of aggravation of symptoms, with a tendency to syncope and great muscular weakness, which latter effects were also marked in the case of the cook, who continued for some time to be troubled by dilatation of the pupils and disturbed vision. At the end of nine days there was no further appearance of danger, and the two most severely affected were well on the way to recovery.

Unfortunately no bacteriological examination was made either of the meat or the discharges, but the nature of the symptoms leaves no room for doubt as to their cause.

Another case in which five persons were affected is reported by DR. MEREDITH YOUNG (*Public Health*, June, 1899). Here the offending meat was three-quarters of a pound of "pig's cheek," which was eaten at half-past four in the afternoon, between which time and the onset of symptoms nothing else was eaten. On the following morning Mr. A. was seized suddenly with vomiting, purging, and severe abdominal pain, and shortly afterward became very feverish and weak, and suffered from severe frontal headache. His wife had severe abdominal pain, and toward noon was strongly purged. She suffered nausea, retched, but could not vomit; had fever and severe headache, and was much more prostrated, and took more time to recover than her husband. She was unable to take food for three days. Their daughter was taken sick at the same time and with the same symptoms, though less severely. Her chief symptom was a strong and overpowering tendency to sleep. A fourth person, who ate but little as compared with the amounts ingested by the others, was slightly purged, but suffered nothing more. The remaining member showed no effects until during the second night. On the following morning she was feverish, had severe headache and abdominal pain, and retched unsuccessfully. Purging did not occur until the afternoon. As was the case with the daughter, the most prominent symptom after the onset was somnolence. Recovery followed in every case. Investigation showed that the cheeks had been cooked two days before, and had been placed together to cool and "set." It was estimated that between fifty and sixty persons had purchased of them, but all but a small proportion were unknown to the seller, and so no systematic inquiry could be made. Four only could be followed up, and two of these reported no trouble; a third was made severely sick and lost two days' work, and the fourth, after eating, drank so much beer that he was made sick and lost it all by vomiting, and yet was affected like the others, but not so actively. In this set of cases, too, it was impossible to procure any of the meat or vomited matter or dejections for bacteriological examination.

A much more extensive outbreak, involving nearly fifty people, one of whom died, is reported by DR. W. SILBERSCHMIDT (*Zeitschrift für Hygiene und Infectionskrankheiten*, XXX. 328). This was due to a kind of sausage known in Switzerland as "Landjäger" (gendarme). It is made of beef, often, also, horsemeat, with pig fat. The materials are chopped rather coarsely, spiced, put into casings, pressed flat for a day, smoked two days, dried in the air several more days, and then eaten in the raw state. The particular sausages in this instance were made of cow beef, from animals that had been certified as sound by the veterinarian, and pork that had been bought about two weeks previously and kept with preservative salt, and had appeared quite fresh and unchanged when used. In the morning of the first day when the sausages were on sale a man and his wife ate one of them together, and both were made so sick toward evening and during the night that a physician was called. In the afternoon of the same day nineteen fishermen ate of them, and on the following day it was reported that all of them had been made sick. In the evening another man ate one, and it pleased him so much that he took another home to his wife and children. On the next day he had abdominal pains, headache, vomiting, diarrhœa, thirst, and a chill. In the afternoon his wife and his two children that had eaten were similarly seized. A boatman who ate two whole sausages suffered

no inconvenience beyond a little pain on the following day. Another, who was sick eighteen days, and then returned to his work, was seized again ten days later with the same train of symptoms.

One young man, aged eighteen years, entered the hospital in the morning of the second day, and died during the night, two days and a half after ingestion of the sausage. At the time of entrance the abdomen was sensitive, and he was passing grayish watery stools; in the afternoon he was delirious, and his pulse was very small, irregular, and rapid. During the night he collapsed and died. Section after twelve hours showed a spleen of normal size, swollen mesenteric glands, and hyperæmia of the stomach and intestines. The follicles were much swollen, and in the ileum were several areas from 4 to 6 cm. in length by 1 cm. in breadth, where the mucous membrane was discolored and eroded. Other organs were normal. Six others of those affected were discharged from the hospital after from seven to fifteen days' treatment.

In an adjoining town, where sausages of the same lot were sold, there were sixteen other cases, all with the same symptoms. Taking all the cases together, the symptoms of prominence were as follows: Very severe, partially crampy, abdominal pains; very profuse diarrhœa, the stools numbering from eight to twelve per day, and in color varying between gray, greenish, and yellow; usually vomiting, the rejected matters being watery and brownish; sunken eyes, high fever, great lassitude, tenderness over abdomen, cramps in the calves, great thirst, and, occasionally, meteorism. In most of the cases the symptoms appeared on the day after eating. The duration of the illness ranged between one and thirty days, the greater number recovering in two weeks, and becoming fit for work in three.

As is commonly the case in these food outbreaks, the attention of the authorities was not drawn to the matter in either town until some days had elapsed. Chemical analysis of unused sausages were made at both places. One analyst reported negative results; the other reported the presence of ptomains, but did not further particularize. Bacteriological investigation revealed the presence of a variety of organisms, as was to have been anticipated, and among them, especially marked, *proteus vulgaris*, but no specific pathogenic bacteria were found.

Silberschmidt calls attention to the fact that the smoking to which the sausages had been subjected, while not destructive to the bacteria of putrefaction, was successful in masking any unpleasant smell or taste due to the process, and urges the warning of the public against eating smoked sausages in the uncooked state. In this case there was nothing to indicate that the animals from which the meat was derived were not in a perfectly healthy condition.

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